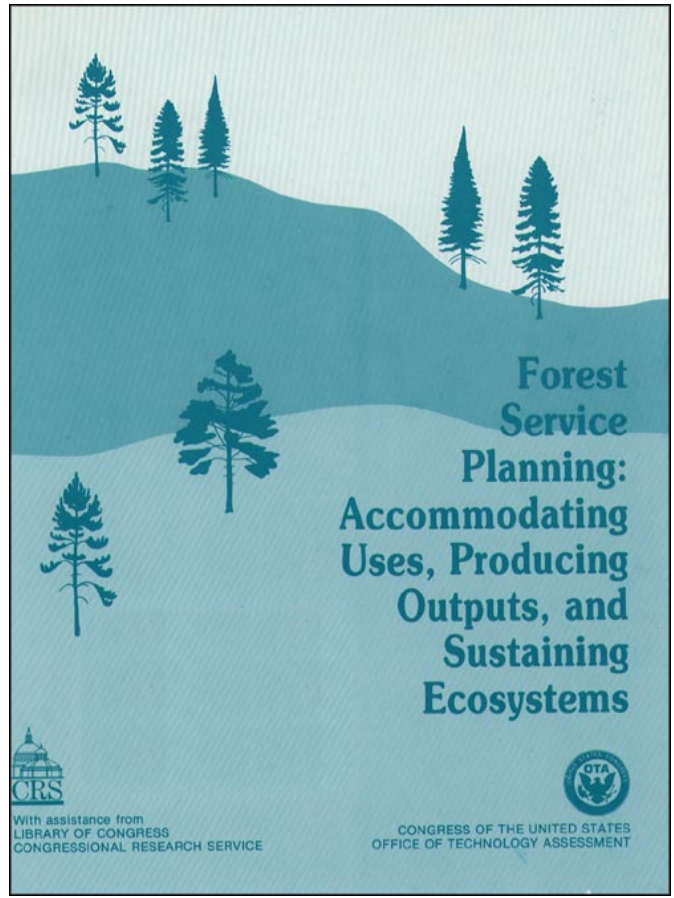
Forest Service Planning: Accommodating Uses, Producing Outputs, and Sustaining Ecosystems

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Foreword

America's forests and rangelands provide valuable commodities and amenities for U.S. citizens. Forests and rangelands account for two-thirds of all U.S. lands, and 40 percent of those lands are owned by the Federal Government. Forests and rangelands generate clean water, forage for livestock and wildlife, timber for construction, habitat for fish and wildlife, space for recreation, and pristine wilderness settings. The demands for these products and services rises as the country's population grows and leisure time increases. Thus, we are faced with increasing conflicts over the use of forests and rangelands, especially the Federal lands, and concerns about their long-run protection.

Congress enacted the Forest and Rangeland Renewable Resources Planning Act (RPA) in 1974, to assure long-term sustainable management of our Nation's renewable natural resources and to increase public involvement in associated policy and budget debates. In 1976, Congress amended RPA in the National Forest Management Act (NFMA) to guarantee sustainable management for the national forests managed by the USDA Forest Service and to assure active public involvement in the forest planning process.

Congress questioned the effectiveness of planning at the forest level under NFMA and expressed concern over the direction the process is headed. Most local forest plans have taken much longer to complete than anticipated, and frequently Congress has been asked to address controversial issues that it expected to be resolved in the planning process. Numerous administrative appeals and litigation of forest plans have come from environmentalists, business interests, and local governments.

In 1989, the House Committee on Agriculture, together with the House Interior and Insular Affairs Subcommittee on National Parks and Public Lands and the Senate Committee on Agriculture, Nutrition, and Forestry, requested that the Office of Technology Assessment examine the Forest Service's use of resource planning technologies. In ***Forest Service Planning: Setting Strategic Direction Under RPA,*** released in July of 1990, OTA evaluated past RPA efforts and identified options for improving RPA's contribution to long-range planning and to policy and budget deliberations. This second OTA report on forest planning evaluates technological, biological, social, economic, and organizational dimensions of national forest planning. It discusses the agency's planning technologies, the appeals and litigation processes, and the relationship between national planning under RPA and forest-level planning under NFMA. The assessment presents options for Congress that could improve forest planning under NFMA.



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NOTE: OTA appreciates and is grateful for the valuable assistance and thoughtful critiques provided by the advisory panel members. The panel does not, however, necessarily approve, disapprove, or endorse this report. OTA assumes full responsibility for the report and the accuracy of its contents.

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[1] @ detail from the Congressional Research Service.
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Summary

INTRODUCTION

The Forest Service is one of the major Federal land managing agencies. It has been part of the Department of Agriculture since 1905, and now manages some 191 million acres of land in 43 States. The Forest Service Organic Act of 1897 and the Multiple-Use Sustained-Yield Act of 1960 (MUSYA) guide the management of these lands, providing for a variety of uses and outputs---commodities ***(e.g.,*** timber, livestock forage, and fuels and minerals) and unmarketed values (e.g., recreation, wildlife habitat, and water flows)--and requiring management for sustained productivity.

The laws provide little guidance on how to balance the various resource values and assure sustainability. Initially, conflicts were managed by separating uses over space or time. However, demands on the resources have continued to climb, and unmarketed resources are now more widely valued by our society. Congress enacted the legal requirement for national forest planning in the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). The principal purpose of RPA was to establish a national strategic planning process for meeting these conflicting demands while assuring the sustainability of America's renewable resources. RPA also directed the Forest Service to prepare integrated land and resource management plans for units of the National Forest System. As part of the RPA Program, the Forest Service was to develop the plans in accordance with MUSYA and the National Environmental Policy Act of 1969 (NEPA).

Congress amended RPA with the National Forest Management Act of 1976 (NFMA). (See box l-A,) NFMA was largely a response to lawsuits that would have substantially reduced Forest Service timber sales. The new law provided guidance for forest planning by further emphasizing environmental considerations and quality standards. Congress also intended NFMA to aid in implementing MUSYA. Under NFMA the Forest Service retained much of its discretion in managing the national forests, but was required to involve the public in the planning process.

Significant administrative and legal challenges have plagued national forest management and forest plans over the past 10 years. Congress has expressed concern about potential impacts of appeals and litigation on timber sales, employment, and budgets. Some of these challenges call for improving Forest Service compliance with environmental requirements. Others call for improving public involvement in the planning process. Still others blame FORPLAN —the planning technology the Forest Service has chosen as its analytical tool—for a planning process that is complex and insensitive to nonuse values, such as preserving endangered species.

Box 1-A—NFMA Planning

The National Forest Management Act of 1976 (NFMA) was largely an amendment to the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). RPA, as enacted, required the Forest Service to prepare land and resource management plans for units of the National Forest System. The agency was to use an interdisciplinary approach to integrate physical, biological, economic, and other sciences. NFMA added guidance for public participation and for Forest Service considerations and standards in the planning process. These land and resource management plans are often called forest plans, and the process is typically called forest or NFMA planning.

This OTA report presents a comprehensive assessment of national forest planning by the Forest Service. It evaluates technological, biological, social, economic, and institutional dimensions of forest planning. The report discusses the appeals process and the merits and weaknesses of the agency's planning technologies. It then presents options for Congress that could improve forest planning under NFMA.

FOREST PLANNING AS STRATEGIC PLANNING

Strategic planning is a process for establishing management direction. The 1897 Organic Act, MUSYA, NEPA, RPA, and NFMA implicitly require a strategic planning process for the national forests. The Organic Act and MUSYA establish the basis for the Forest Service to accommodate uses and provide outputs while sustaining forest ecosystems. MUSYA acknowledges that people's needs determine the proper mix of uses and outputs, and that the mix can change over time. NEPA provides a framework for reporting intended actions and possible results of those actions to the public. RPA requires the Secretary of Agriculture to evaluate the Nation's renewable resources and to consider their future use and sustainability. NFMA establishes management considerations and environmental standards and guidelines, and requires public involvement in developing and revising management plans.

Strategic planning goals must be specific enough to provide clear direction for management activities and concrete enough to measure success. A forest plan should identify what kind of uses, outputs, and conditions are feasible and desirable. It should focus on issues of public concern, explaining how management will affect key sites, produce important outputs, and protect vital resources and ecosystems. By focusing on issues and explaining management changes, a strategic forest plan can guide the agency and inform the public.

MULTIPLE USE AND SUSTAINED YIELD

Multiple use, according to MUSYA, is the management of renewable resources on the national forests to best meet the needs of the American people without impairing the productivity of the land. The Act calls for forest management based on relative resource values, not just on maximizing returns or outputs.

Multiple-use management has come to mean either joint production (using the same land for several uses simultaneously) or dominant use (using different parts of the land for different uses). Management based on joint production is difficult because of the lack of biological and social information on ecological interactions. Dominant-use management is complicated by the difficulty of determining which lands to manage for which uses.

Multiple use, to some, implies use of commodity resources (e.g., timber, livestock forage, and minerals). Areas where laws restrict commodity uses, however, such as recreation sites and wilderness areas, can still produce multiple values (e.g., recreation, wildlife habitat, and water flows). As a concept, multiple use assures consideration of varied resource uses and outputs, and seeks an appropriate balance among these. However, the concept provides little guidance for managers on how to balance conflicting uses and outputs.

MUSYA represents the frost attempt by Congress to apply the goal of sustained yield broadly, to all renewable resources. Sustained-yield management requires maintaining the productivity of the land while producing high levels of annual outputs. Sustained-yield management of the national forests has been compromised by a lack of knowledge about ecological and social relationships and by a technical bias favoring production of individual resources over ecosystem management and protection. (See box l-B.)

PUBLIC INVOLVEMENT IN FOREST PLANNING

The Forest Service has a long history of soliciting public input in its decisionmaking processes. Before NFMA, this was generally informal and sporadic. With the enactment of NFMA, Congress reinforced the public's right to participate in agency planning and decisionmaking. NFMA embraces the notion that conflicts can be addressed best by integrating the public into the decisionmaking process early and often.

Consensus today is that the Forest Service has not used public input efficiently or effectively in its planning process. Much current criticism is similar to that heard at least 20 years ago: the agency asks for public input, but the input does not affect final decisions. Despite numerous opportunities for individuals and interest groups to participate throughout the planning process, many final forest plans appear not to accommodate public concerns.

The ineffective involvement of the public in the planning process may result from several factors: use of incorrect models of public involvement, lack of information on how to involve the public,

Box l-B—Trust Fund

The National Forest System is, in many respects, comparable to a trust fund established to provide continuous and permanent natural resource benefits. The 1897 Forest Service Organic Act established forest protection, stable water flows, and continuous timber supplies as the purposes for forest reserves. The Multiple-Use Sustained-Yield Act of 1960 requires the Forest Service to maintain the productivity of the land. Such direction shows Congress' desire to maintain the resources of the national forests, much as the assets of a trust fund are conserved. In the forests and the trust fund, managers are responsible for protecting the assets. Annual benefits are important, but preserving the productive assets is paramount.

Two aspects of the National Forest System complicate the trust fund analogy. First, the annuities of the National Forest System include not only uses and outputs, but also nonuse values (e.g., various aspects of relatively undisturbed ecosystems). Second, the Forest Service, as required by law, provides the public with opportunities to participate in the national forest planning process. Thus, the public both benefits from and influences the management of the National Forest System. This contrasts with traditional trust funds, where the beneficiaries are relatively isolated from trust management.

professional resistance to the public's ideas, and inflexible conditions for managers. Most national forest managers still fail to recognize the purpose of public involvement, believing public participation is primarily an exercise in gathering information.

In fact, there are several reasons to involve the public in the planning process. First, the public must agree to, or at least accept, the management activities for the national forests and the overall direction management takes. The public is more likely to accept decisions if it has been involved in the process, understands the limits of the resources, and sees that consensus sometimes cannot be reached. Public participation also can serve as an early warning system. Public comments can alert agency planners to issues and concerns that are likely to cause significant controversy in the future. By working with the public, agency planners can develop plans that address current and emerging concerns and, thereby, avoid making decisions that prompt appeals and delay implementation.

No one best way exists to facilitate public participation in forest planning. The most effective means vary with decisions to be made, geographical setting, and preferences of the local publics. For example, a town meeting might work well in New England where town meetings have a rich history, but might fail in other parts of the country. Furthermore, some people like public hearings while others prefer personal interaction. Whatever procedures are chosen should encourage and stimulate debate, and managers should clearly respond to public desires and concerns. Otherwise, citizens and interest groups will seek other forums, such as Congress or the courts, to influence forest policy and decisionmaking.

The administrative appeals process offered by the Forest Service is best characterized as an extension of public participation provided for under NEPA and NFMA. The process allows any individual to request an agency review of forest plans or agency decisions. The administrative appeals process has helped the Forest Service to: 1) clarify planning decisions; 2) set standards for environmental analyses required by NEPA; and 3) resolve various issues, such as use of management indicator species, protection of biological diversity, and adequacy of resource monitoring plans. The appeals process has been costly and time-consuming, because it has forced the agency to resolve complex questions under NEPA and NFMA. However, what has been learned from the frost round of plan development may make later revisions easier. The number of administrative appeals is surprisingly small, given the level of concern, but may be locally significant, and the Forest Service has often not met the deadlines specified in the regulations. Data on the number, location, rationale, significance, and effects of administrative appeals are not available, however, so it is impossible to evaluate the effectiveness of the current system.

Litigation is the final recourse for individuals or groups dissatisfied with Forest Service decisions. Judicial review assures that decisions are consistent with legal direction. Despite the substantial controversy surrounding spotted owls and old-growth forests in the Pacific Northwest, few Forest Service plans or activities are litigated. Congressional efforts to change the judicial review process seem to be attempts to resolve substantive issues without appearing to take sides. However, such changes are unlikely to improve forest planning or plan imple-

mentation, or to reduce conflict over national forest management.

BIOLOGICAL DIMENSIONS OF FOREST PLANNING

Strategic planning depends on an analysis of resource conditions and trends. Inventories provide baseline data on forest resources. Monitoring then permits an evaluation of trends in the quality and quantity of these resources. Forest inventory and monitoring activities have long been criticized for failing to support integrated, multiresource programs. This failure is due largely to a historical emphasis on timber resource inventories, inattention to ecosystem processes, and insensitivity to the need for statistically valid data analysis. These problems are exacerbated by inadequate funding for these expensive but necessary activities.

The Forest Service is specifically criticized for not following NFMA inventory and monitoring requirements and for generating sparse, poor quality, and out-of-date information. It is also criticized for failing to follow through with monitoring activities described in the forest plans. Newly proposed 1991 regulations may strengthen the role of monitoring and provide renewed emphasis on integrated, multiresource programs. Lack of money for detailed monitoring, however, will require the Forest Service to revise its monitoring plans to reflect more accurately what is possible and what is most important to accomplish under staff and budget constraints and according to public interest.

Inadequate inventory data has made it particularly difficult to address biological diversity comprehensively. Forest planning regulations require the Forest Service to maintain diversity of plant and animal communities and to select and monitor a set of management indicator species. These species are to serve as surrogate measures of the health of biotic communities in relation to management activities. However, the Forest Service lacks guidelines, training, and expertise to select and monitor indicator species and some of the selected species have not been monitored. Use of indicators should focus on an improved selection process, and should provide information on the consequences of management activities as well as on current habitat conditions and ecological processes.

FOREST PLANNING TECHNOLOGIES

Technologies useful to forest management clarify resource location, analyze resource availability over time, and assess effects of decisions on ecosystems and on human values. Computer models, as one technology to help with these evaluations, provide estimates of what might happen under various management options.

The most useful technologies for examining spatial resource interactions are geographic information systems (GIS). These systems can superimpose locational data for two or more resources or activities (e.g., timber stands over soil types). In so doing, GIS can contribute to resource management decisions and to public understanding of resource interactions. These systems, however, are very expensive to acquire and develop, and must be based on reliable data. To date, the Forest Service has not used GIS extensively in forest planning, largely because of program and funding restrictions imposed by Congress.

Linear programming is also a useful technology for analyzing resource use. Linear programming models for land management try to maximize resource uses and outputs over time within ecological limits. The models can provide the Forest Service with information on how to meet the requirements of sustainable timber production and coordination of timber harvesting with other uses. Linear programming, however, requires massive amounts of data to define interrelationships among resources; excludes analysis of risk and uncertainty; and necessarily assumes direct, continuous, and reversible relationships among resources.

Resource simulation models are the principal technologies used by the Forest Service for estimating ecological and environmental responses to activities. These models try to quantify relationships among resources and results of management actions. Simulations such as timber growth-and-yield models and sediment yield models often examine consequences of management activities for a single resource. The regional diversity of forest resources has led to many unique, local models rather than universal models. Simulation models commonly are used as input to other models, such as linear programming models.

Economic and financial consequences of management must also be considered in planning. This can be done, in part, by examining the benefits and costs of the proposed activities, the approach taken in FORPLAN. In addition, models are used to estimate the local economic effects of management decisions. Input- output analysis is the traditional model used, and the Forest Service has developed variations of such a model--IMPLAN--for forest planning.

The Forest Service designated FORPLAN as the principal analytical tool for forest planning. FORPLAN is a linear programming model that maximizes the present net value of resource uses and outputs (i.e., maximizes management efficiency) within specified constraints. The Forest Service uses FORPLAN because it performs certain tasks well and because it helps organize planning around selected issues. The strengths of FORPLAN include its enormous analytical capacity; its focus on important issues (i.e., how much timber can be cut and from which areas); and its common language for analysts.

FORPLAN is limited by its requirements for massive amounts of data on ecological interactions and for market prices for all resource uses and outputs. FORPLAN includes nonuse values-such as protecting watersheds, preserving endangered species, and improving aesthetics-only as constraints rather than as goals. This implies that sustaining ecosystems is a constraint on production, and not a goal for managing the national forests. Further, FORPLAN, and linear programming g generally, has little capability to analyze spatial concerns.

Some resource managers and public interests mistrust FORPLAN because of its large size and complexity, problems with documentation and verification, and poor understanding of how to use the results in decisionmaking. Nonetheless, FORPLAN can be a useful analytical tool if the Forest Service uses it with other technologies and to support public understanding.

ECONOMICS IN NATIONAL FOREST PLANNING

Economic considerations in strategic planning for national forest management involve determining the balance among resource values and identifying impacts of national forest management on communities. MUSYA calls for consideration of the relative values of resources, while RPA and NFMA set up requirements for economic analyses. Through these requirements, Congress intended the Forest Service to determine the proper balance among resource uses, outputs, and protection through interaction with the public. Although Congress rejected economic efficiency as the principal consideration for managing the national forests, it has been emphasized in national forest planning.

The Forest Service uses FORPLAN as an economic efficiency model in national forest planning. In terms of achieving economic efficiency, FORPLAN is limited by uncertainties over the comparability of market prices and other values, difficulty in balancing uses and outputs with nonuse values, and inaccurate cost and value data. FORPLAN's capability to assess efficiency of forest management alternatives also is limited by the lack of knowledge of quantity and quality changes in all resource values that might result from the management activities.

Community stability is a common local concern in forest planning. The Forest Service is limited in its ability to assess and achieve community stability because of imprecise definitions, the lack of measures of stability, the difficulty in measuring the acceptable pace and amount of change, and the agency's inability to influence resource or product demand.

The Forest Service uses IMPLAN, an input-output model adapted to each national forest, to assess employment and related impacts on communities. However, the county-level data used can mask differences among communities within a county. Furthermore, input-output models only provide comparable analysis for certain resource-based sectors. For example, the models define lumber and wood products as a single manufacturing industry, whereas recreation is scattered among several industries in the retail trade and service sectors.

Restructuring payments to counties based on timber sales may provide one way for the Forest Service to avoid causing community instability. At present, the Forest Service returns 25 percent of its gross receipts to the States for use on roads and schools in counties that contain national forests. Forest Service payments account for a large portion, up to 80 percent, of operating budgets in some Pacific Northwest counties. Timber typically accounts for most of the payments, usually 95 percent

of the total nationally, but the payments vary widely from forest to forest and from year to year. Thus, the counties have little certainty about annual payments, but are more likely to support Forest Service timber sales than other activities in the planning process. Fair and consistent compensation for the tax exempt status of national forest lands and activities could stabilize county payments, regardless of how the lands are managed,

THE BUDGETING PROCESS

The annual Forest Service budget is the direct link between Congress and national forest management. Budgets in some forest plans have been constrained, providing a picture of financially feasible opportunities; in other forest plans, budgets have been unconstrained, providing an examination of a wide array of alternatives. Unconstrained budgets probably will not mesh with spending realities, and do not provide information on priorities, but constrained budgets exclude possible opportunities. Because of the different budget assumptions, the forest plan budgets cannot be aggregated to a simple National Forest System budget proposal.

The national Forest Service budget and appropriations are broken down by resource, in line item appropriations. These appropriations must be translated into integrated resource projects by resource managers. The imprecision of this translation and the difficulty of setting priorities among the line items has led to accounting data that may not reflect actual expenditures for managing the resources. Accountability is further complicated because target accomplishments for commodity resources, especially timber, are readily measurable whereas target accomplishments for noncommodity resources are not.

End-results budgeting, as proposed by the Forest Service, would collapse line items for national forest management into one operation and maintenance account. The agency would record separate line items for investments, such as roads, trails, and reforestation. The effectiveness of this budgeting system depends on accurate measures for changes in conditions of all resources in response to management activities. Although the General Accounting Office (GAO) reacted favorably to a test of end-results budgeting, the necessary measures of condition to demonstrate the end results of management are not sufficient at this time. Congress also may perceive a loss in control over the budget for each resource program. An alternative approach might be congressional appropriations by activity+. g., planning, operations, maintenance and protection, investments, and monitoring.

Fourteen permanently appropriated special accounts or trust funds account for nearly a third of the Forest Service budget. Six of the largest are principally related to the timber program. The Forest Service has substantial discretion to determine the amount of money deposited in four of these funds —the Knutson-Vandenberg (K-V) Fund, the Salvage Fund, brush disposal, and other cooperative deposits—which are to be used on the national forest where the money was collected. Despite the substantial discretion to determine local budgets through timber management activities, Congress has exercised little oversight or control over the special accounts and trust funds.

ORGANIZATIONAL FACTORS IN FOREST PLANNING

For at least half a century, the Forest Service was viewed as a premier Federal agency. It was seen as a strong and independent manager of public resources for the public good. Professionalism within the Forest Service provided the basis for its long history of success; however, as it is dominated by professionals and technicians trained in forestry, the agency has given emphasis to the management and use of trees. Although this emphasis has had merit in past national forest planning, public perceptions of the relative values of forest resources have been changing. Social values today are less utilitarian and less accepting of traditional forestry practices that may harm nonuse values of the forests. The profession and the agency have been changing, but many believe the change is too little too late.

The Forest Service, in accordance with NFMA and NEPA, has developed an interdisciplinary approach to forest planning. The agency uses teams of specialists in wildlife, forestry, recreation, engineering, hydrology, soils, economics, range, and many other fields. A diverse workforce brings a broader array of ideas, leading to increased creativity and flexibility for the organization. Efforts to diversify have been overshadowed, however, by the agency's traditional organizational structure by resource function, especially at regional and national offices. The emphasis on individual resources makes

integrated project planning and implementation difficult.

Most Forest Service employees believe that timber production is rewarded by the agency above other resource uses and values. More generally, agency employees believe that productivity (meeting targets, working hard, and being competent) and team spirit (loyalty, teamwork, promoting the Forest Service image, and getting along with peers) are the most rewarded organizational values. These organizational values differ from personal values held by many Forest Service employees, who, regardless of their professional training or level in the agency, tend to value recreation over other uses, followed by wildlife and water. Many employees also believe that concern for healthy ecosystems should be rewarded to the same degree as professional competence, hard work, and teamwork.

The mismatch between apparent agency and employee values may reflect several difficulties. These include changing established modes of operation, external pressures, and a reward system that typically measures the tangible outputs of commodity resources and ignores the intangible unmarketed and nonuse values.

To be implemented, the forest plans must be technically and politically feasible, i.e., consistent with scientific information, with public goals, and with national decisions. Technical feasibility can be assessed annually by comparing outputs, changes in conditions, and unit costs with those in the forest plan. Political feasibility can be measured, in part, by the number of administrative appeals and lawsuits filed against a plan. However, additional measures of the effectiveness of public involvement and manager responsiveness need to be developed to assure that managers are properly rewarded.

NFMA FOREST PLANNING IN RELATION TO NATIONAL RPA PLANNING

RPA establishes a strategic planning process at the national level structured around four documents: the RPA Assessment, the RPA Program, the Presidential Statement of Policy, and the Annual Report. NFMA establishes a strategic planning process at the local level, using an interdisciplinary approach and public involvement. The Forest Service regulations describe RPA-NFMA planning as iterative, in that information from the forest level flows up to the national level and information in the RPA Program flows back to the forests. The Forest Service historically approached planning as a hierarchical process, allocating resource targets from the RPA Program to the regions, and from the regions to the forests. The 1990 process, however, was influenced by a more integrated approach using information from the plans in the RPA Assessment and in the Program strategies.

The national forest plans provide information on resource conditions and predicted results of proposed management actions. The RPA Assessment provides information on resource outputs, conditions, and trends on national forests, private, and other public lands. The RPA Assessment can serve as a source book for forest-level planners. Forest planners can design inventory and monitoring activities so data will be compatible with previous inventories and studies in progress. Data can then be more easily aggregated and used in a comprehensive analysis in the RPA Assessment.

The forest plans also contribute to the RPA Program, by identifying the public's preferred management alternatives. Issues and concerns that are widespread at the local level should receive special attention in the Program. As a strategic plan, the Program needs to set direction for national forest planning as well as for Research and for State and Private Forestry. The program, however, should not override local decisionmaking. Instead, it can augment local planning by addressing regional, national, and global issues not identified locally and provide direction for forest plan revisions.

The forest plans can provide information to the Annual Report on expenditures and results of management on each national forest. This information can be used to assure spending is balanced and efficient. Reporting on expenditures, outputs, and conditions should be consistent among forests and with the RPA Assessment so data can be aggregated and compared and trends assessed.

Target allocations from annual appropriations and the RPA program are difficult to ***mesh with*** local planning, primarily because targets are set only for certain outputs. Forest managers lack measures for annual nontimber outputs and nonuse values and, thus, are generally ill-equipped to demonstrate balance in achieving stated goals. Strategic planning does not require eliminating national targets. In fact,

targets are critical for reaching stated goals for various resources at different times. Hard targets for selected outputs, however, do not encourage an interactive flow of information from the local level to the national level and, thus, run counter to functional strategic planning and the iterative process.

Resource capability information developed at the local level is a base for RPA planning, whereas national objectives are essential to strategic planning and the setting of long-term goals. The process must be centralized to take a comprehensive look at overall direction and to integrate budgeting and performance appraisal. However, the process also must be decentralized to treat individual forests appropriately and to assure that local plans are technically and politically feasible.

ROLE OF CONGRESS

OTA has identified four major findings on forest planning:

1. Plan development emphasizes timber and other physical outputs.
2. Monitoring of forest management activities is inadequate.
3. Budget decisions overwhelm planning decisions.
4. National targets can nullify local decisions.

In view of these findings, OTA has identified 14 options available to Congress to improve forest planning under NFMA. These options are discussed below under the corresponding finding. (See table l-l.)

Table l-l—Major Findings on NFMA Forest Planning and Possible Options for Congress

Findings	Options
Plan development emphasizes timber and other physical outputs	Clarify legislative direction
	Broaden the information base
	Establish targets for all resources
	Improve public involvement
	Expand use of information technologies
Monitoring of forest management activities is inadequate	Separate the monitoring function
	Require linkage between actions and results
	Require public involvement in monitoring
Budget decisions overwhelm planning decisions	Eliminate appropriations by resource
	Require realistic budgets in forest plans
	Control special accounts and trust funds
	Compensate counties fairly and consistently
National targets can nullify local decisions	Specify forest plans as the baseline for RPA planning
	Require RPA direction for all resources and all branches

SOURCE: Office of Technology Assessment, 1991,

Finding 1: Plan development emphasizes timber and other physical outputs.

The Forest Service emphasizes allocating lands and producing physical outputs, especially timber, in forest planning and gives little attention to sustaining ecosystems. MUSYA, NFMA, and the planning technology FORPLAN encourage the emphasis on timber and other physical outputs. Forest plan implementation, budgeting, and national direction also emphasize land allocation and the quantitative, physical outputs of the national forests.

Option 1: Clarify legislative direction.

Congress could amend the laws guiding national forest planning and management to recognize the nonuse values of the national forests and to assure the protection of the ecosystems that generate the use and nonuse values.

MUSYA could be amended to expand the purpose of the National Forest System. The expanded purpose could include providing for all the use and nonuse values of forests and rangelands. Multiple-use management could be expanded to include multiple values of the lands, and focus on sustaining national forest ecosystems. Amendments to NFMA could require a determination of land suitability for all management activities and could require forest plans that aim to sustain all values, including nonuse values.

Option 2: Broaden the information base.

Congress could require the Forest Service to expand its forest planning inventory and analytical base to include necessary information and models on all resources, on ecological interactions, and on social and economic impacts.

NFMA planning has initiated few resource inventories beyond those already used in forest planning and management before NFMA. Inventory data and models for the timber resource are more extensive than those for other resources or for ecosystem conditions. Data and models for examining economic results of management activities are more complete for timber outputs than for other outputs and conditions. Congress could direct the Forest Service to balance its forest planning information base and increase inventory funding, to assure that analysis responds to public concerns over national forest goals and management practices.

Option 3: Establish targets for all resources.

Congress could require forest plans to specify targets for all resource uses and outputs, for nonuse values, and for ecosystem conditions identified as important by the public in its participation in the planning process.

Congress intended forest plans to set the direction for managing national forests. Current Forest Service databases and analytical tools, however, primarily measure physical outputs. Congress could require the Forest Service to develop measures that more fully describe management direction for the national forests. The Forest Service could then identify targets for all uses and outputs, for nonuse values, and for ecosystem conditions in the forest plans and in RPA planning.

Option 4: Improve public involvement.

Congress could clarify the purposes for involving the public in forest planning, and could direct the Forest Service to improve its public participation processes.

Vague guidance in the forest planning laws has led the Forest Service and the public to conflicting expectations about how public comments are to be used in determining the future direction of national forest management. The Forest Service model of public participation impedes effective participation because the public is viewed as an information source for identifying ***output goals,*** rather than as individuals and groups interested in all aspects of management. Congress could amend NFMA to direct the Forest Service to use public involvement to build plans and decisions that are more acceptable to society. The Forest Service also could improve its public participation process by emphasizing the importance of building trust and acceptable solutions or compromises.

Option 5: Expand use of information technologies.

Congress could direct the Forest Service to broaden the variety of technologies used for information collection, analysis, coordination, and presentation to assure that spatial and temporal aspects of forest management are adequately addressed.

Current Forest Service planning technologies are impeded by lack of information on resource interactions, have limited capacity for analyzing spatial concerns, are difficult to understand, and emphasize impacts on the timber industry over other industries. Congress could direct the Forest Service to improve its use of planning technologies by integrating their principal tool for forest planning--FORPLAN—with a GIS. The Forest Service also could be directed to emphasize research on more complete models of economic impacts. Finally, the agency could improve the coordination of data collection and storage, build a historical record for forest planning, and contribute to an integrated RPA Assessment.

Finding 2: Monitoring of forest management activities is inadequate.

An enormous amount of Forest Service and public time and effort has gone into developing national forest plans. Monitoring, however, has been inadequate to determine whether the plans are being implemented. The inadequate monitoring results from an inadequate database, insufficient funding, and lack of incentives to monitor. It is difficult to monitor changes in ecosystem conditions without baseline information on preexisting conditions. The Forest Service system, which includes few nontimber measures for evaluating managers, does not encourage monitoring.

Option 6: Separate the monitoring function.

Congress **could** establish monitoring of forest plans as a separate Forest Service activity, with specified purposes and reporting.

Monitoring is important to determine whether proposed and ongoing management activities are consistent with planning goals. Currently no sanctions exist for incomplete or inadequate monitoring.

Congress could establish monitoring as a distinct Forest Service responsibility. Congress could then require an annual monitoring report, prepared by an interdisciplinary team, with specific requirements and with public participation or review. This would recognize the importance of monitoring, and might reduce the tendency to curtail or eliminate monitoring due to insufficient time or money.

Option 7: Require linkage between actions and results.

Congress could require the Forest Service to identify, in an annual report for each national forest, the results of activities in terms of outputs and conditions and in public participation in the planning process.

An annual report from each forest could be an added requirement under the NFMA planning process. This report could be used internally, for evaluating the performance of forest supervisors and staff, and externally, for informing the public about the results of management practices. The report could show how management activities meet output and condition targets specified in the plans and could also include an evaluation of public participation.

Option 8: Require public involvement in monitoring.

Congress could direct the Forest Service to include public participation in the monitoring of national forest plan activities.

Monitoring is expensive but essential in forest planning. It assures that activities conform with plan direction and achieve the plan goals. Public involvement provides feedback to the agency on how the public interprets the plan's direction. Public involvement also can help the agency focus on key concerns so that the most important outputs and conditions are measured carefully. Finally, public involvement in monitoring can provide checks and balances to assure that measurement is accurate.

Finding 3: Budget decisions overwhelm planning decisions.

The annual Forest Service budget request and appropriations from Congress are inconsistent with the budget levels and mixes assumed in national forest planning. This occurs, in part, because the forest plans set up an integrated approach to land and resource management whereas the budget request and appropriations are arranged by resource activity. Forest plan budgets and annual appropriations also differ because budget assumptions vary in the amount of restrictions. When congressional appropriations conflict with forest plan direction, the former usually directs the course of action because Forest Service employees are responsible for assuring that money is spent as directed. Special accounts and trust funds, which result largely from timber activities, encourage the emphasis on timber outputs by providing counties and the agency with benefits from increased timber sales. Many special accounts and trust funds are permanently appropriated, and receive little attention from Congress.

Option 9: Eliminate appropriations by resource.

Congress could replace appropriations by resource line item with appropriations by management activity. Congress could then direct the Forest Service to develop its budget based on the activities needed to implement the forest plans.

Forest Service budget requests and congressional appropriations are now arranged in about 60 line items, specifying expenditures for resource activities. Proposed funding for each activity is adjusted at each budget step-by the Washington Office of the Forest Service, the Secretary of Agriculture, the Office of Management and Budget, and the House and Senate Committees on Appropriations. Resource-oriented appropriations encourage the administration and Congress to specify output targets, especially for timber, because such targets are easily specified and are controllable by Forest Service managers. The Forest Service gives monitoring a low priority because monitoring does not provide tangible outputs for which the managers can be rewarded and because the agency lacks penalties for inadequate monitoring. Congress could replace resource appropriations with appropriations for the activities necessary for managing the national forests—planning, implementation, and monitoring.

Option 10: Require realistic budgets in forest plans.

Congress could direct the Forest Service to include a range of budget possibilities, from the current forest budget to an unlimited increase, in the final plan for each national forest. The Washington Office of the Forest Service provided no direction on

the budget assumptions to be used in national forest planning. Some regions restricted budgets that forests could assume in planning, whereas other regions provided no restrictions. Budget restrictions are more likely to result in forest plans that are implementable but discourage identifying opportunities for improvement. Unrestricted budgets may specify opportunities for investments but may produce plans that are not realistic and cannot be implemented. Congress could require the Forest Service to include both types of information in forest plans. The agency could then link the forest plans with opportunity analysis in the RPA process and provide information on likely outputs and conditions in the annual budget request.

Option 11: Control special accounts and trust funds.

Congress could require more complete reporting on **the sources and uses** of money in the various special accounts and trust funds, and could clarify the purposes for which the funds could be used.

The Forest Service presents little information on the sources and uses of money in the various special accounts and trust funds that provide about one third of its budget annually. Thus, Congress is unable to exercise much control over their use. Congress could require the Forest Service to present more complete information on the sources and uses of money in the major special accounts and trust funds in the budget request, the RPA Program, the forest plans, and the annual reports. Congress could examine the use of special accounts and trusts funds and clarify the purposes for which the funds could be used.

Option 12: Compensate counties fairly and consistently.

Congress could replace the current program of returning 25 percent of gross Forest Service receipts with a system to compensate counties fairly for the tax exempt status of Federal lands and activities.

Since 1908, the Forest Service has returned 25 percent of its receipts to the States for use on roads and schools in counties where national forests are located. The Payments in Lieu of Taxes (PILT) program, administered by the Bureau of Land Management, also compensates counties for the tax exempt status of Federal lands. It is unclear whether the combination of Forest Service receipt-sharing and PILT payments is fair compensation. In some areas, the counties may receive payments that exceed potential collections from a private owner of undeveloped land. In other areas, the counties may be undercompensated.

Many counties rely on Forest Service timber harvests for large portions of their budgets, but timber receipts may vary by as much as 50 percent or more from year to year. Furthermore, PILT payments require annual appropriations that could face reductions with Federal budget cuts. Congress could replace the current system of receipt-sharing and PILT payments with a system that fairly and consistently compensates the counties for the tax exempt status of national forest lands. Congress could require a study to devise the appropriate compensation methods and levels, and then replace the current system with the new tax-equivalency compensation system.

Finding 4: National targets can nullify local decisions.

RPA established a national strategic planning process for renewable resources. RPA also established a local planning process for preparing land and resource management plans for national forests. NFMA amended RPA to include considerations and requirements for local planning. The Forest Service describes the connection between RPA and NFMA as iterative, with information on capabilities and opportunities flowing from the local level to the national level, and national targets being allocated from the national level to the forests. The allocation of national RPA targets to the forests can negate local agreement about the proper management direction for a national forest. Nationally determined targets also can substantially alter national forest management directions that have been determined with considerable local analysis and public involvement.

Option 13: Specify forest plans as the baseline for RPA planning.

Congress could require the Forest Service to use the management direction established in the forest plans as the baseline for National Forest System outputs and values in the RPA planning process.

National analyses of management options may not account for site-specific interactions and constraints and, thus, can overestimate production possibilities on the national forests. To correct this, Congress could direct the Forest Service to use national forest plans as the baseline for outputs and values and specify that RPA Program direction be consistent with the forest plans.

Option 14: Require RPA direction **for all resources and all branches.**

Congress could require the Forest Service to provide targets and national direction for all outputs and values and for all branches of the agency.

The RPA Program has traditionally established physical output targets for the National Forest System, with only general direction for other values and other branches of the agency. Congress could improve the balance among resources and among Federal and non-Federal lands by directing the Forest Service to establish direction for agency programs to address all outputs and values on all forests and rangelands. Congress could require RPA Program direction for all four branches of the Forest Service, to be defined in long-term goals for productivity and ecosystem health and in short-term targets for outputs and conditions of concern.

Chapter 2

Policy Options

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Chapter 2
Policy Options

The National Forest Management Act (NFMA) was enacted in 1976 primarily in response to successful lawsuits challenging longstanding Forest Service timber sale practices in West Virginia and elsewhere. Because these lawsuits indicated a growing public dissatisfaction with clearcutting and other Forest Service activities, Congress chose to require a public planning process for setting management direction for each national forest. Congress expected that a planning process based on sound information, environmental standards, and public involvement could resolve many local controversies over national forest management.

Many are concerned that the NFMA planning process is not working as it was intended. Forest planning has been controversial, and nearly all forest plans and many actions under those plans (especially timber sales) have been appealed. Litigation, notably over red-cockaded woodpeckers in the South and over spotted owls and old-growth forests in the Pacific Northwest, has focused nationwide attention on national forest management.

The current controversies over national forest planning and management have led some, including Members of Congress, to question the efficacy of the planning process, and a few agency critics have suggested repealing the requirement for forest plans. However, plans are necessary for coordinating activities, and the public is interested in national forest management. Repealing the requirement for a public planning process probably would return the Forest Service to a situation akin to that which led to the Monongahela lawsuit, the Bitterroot controversy, and other conflicts that led to NFMA in the first place.

No simple means exist for ending the conflicts over national forest management, because people care about the national forests and have different opinions on how the forests should be managed. Nonetheless, the planning process could be modified to reduce the nationwide conflicts by improving the process for resolving local differences. OTA has found problems and potential for improvements in forest plan development, in forest plan implementation, in Forest Service budgeting, and in forest planning direction. Singly and in combinations, these options could move national forest planning toward the goal Congress envisioned in NFMA--a strategic planning process for developing and implementing publicly acceptable management direction for the national forests.

FOREST PLAN DEVELOPMENT

Finding 1: Emphasis on Timber and Other Physical Outputs

The Forest Service emphasizes allocating lands and producing physical outputs, especially timber, in national forest planning. Certainly outputs are important. The forest reserves (national forests) were established to provide stable water flows and continuous timber supplies while protecting the lands and resources. They are, in many ways, analogous to trust funds. (See box 3-C, p. 48.) Outputs are the annuity from the trust fund. However, the ecosystems are the investment that generate the annuities; and their sustainability is paramount.

Forest planning today gives relatively little attention to sustaining ecosystems. Emphasis on measuring and producing physical outputs must be balanced with the nonphysical ‘‘outputs"—the nonuse values of forests, such as spiritual appreciation or preserving a legacy for future generations. Planning generally provides for nonuse values through land allocations-recommendations for wilderness and identification of lands not suited for timber production--but such allocations are indirect measures that divide interests and ignore mutual benefits. The relative inattention to sustaining ecosystems and to providing nonuse values, the increasing demand for all resources, and conflicting social values are at least some of the reasons for the acrimony over national forest planning.

The emphasis on timber and other physical outputs results from a wide variety of factors throughout the Forest Service’s planning and management systems. (This is not to say that timber dominates the management of all national forests, but that the agency’s structure and programs systematically accentuate timber and other physical outputs over other values.) The Multiple-Use Sustained-Yield Act of 1960 (MUSYA) implied such a focus on outputs. Likewise, NFMA focused more on

regulating timber management than other activities. It is easier to inventory timber than to inventory other resource conditions and values. In addition, the principal planning technology--FORPLAN--was developed from a timber harvesting scheduling model, and the goal (objective function) of the model is to maximize those outputs that can be quantified. Other aspects of planning and management—implementation, budgeting, and national direction—also emphasize the quantitative, physical outputs of the national forests.

Plan Development Options

Implementable national forest plans will necessarily include a balance of uses, outputs, and nonuse values, with management that is sensitive to ecosystems and acceptable to the public. The current systematic emphasis on timber and other physical outputs makes the development of acceptable forest plans difficult, at best, as suggested by the difficulties the Forest Service encountered in preparing the first round of forest plans. A number of steps could be taken to assist in achieving the balance necessary to develop acceptable plans.

Option 1: Clarify the legislative direction.

> **Congress could amend the laws guiding national forest planning and management to recognize the nonuse values of the national forests and to assure the long-run productivity of the ecosystems that generate the use and nonuse values.**

Several laws guiding planning and management of the national forests contribute to emphasis on physical outputs. The 1897 Forest Service Organic Act notably is not a problem. The frost purpose it identified for the forest reserves was to improve and protect the forests, and the second was to secure favorable water flows--a nonuse value of the forests (although water also has value in use). The Organic Act also authorized regulation of the occupancy and use of the forests ''to preserve the forests . . . from destruction. Thus, the Organic Act is fully consistent with the trust-fired concept of the national forests—to provide use and nonuse values and to protect the ecosystem base.

The Multiple-Use Sustained-Yield Act of 1960, however, does contribute to the physical output focus. MUSYA promotes the utilitarian view of national forests, listing as purposes either direct, on-site activities (e.g., recreation and timber) or surrogates for such activities (e.g., range, watershed, and wildlife and fish). Nonuse values, such as aesthetics, spiritual appeal, and future legacies are, at most, implicit in the act. Furthermore, sustained yield contributes to this focus on the direct, on-site uses and outputs by emphasizing their continued production, rather than emphasizing the management of the ecosystems that generate all forest values. Amendments to MUSYA could; 1) expand the purposes of the National Forest System to that of providing all the use and nonuse values of forests and rangelands; 2) expand multiple-use management to include the multiple values of the lands; and 3) focus on the sustainability of the ecosystems that comprise the national forests.

NFMA has also contributed to the timber focus by providing additional regulatory guidance for continued timber production while protecting other values. Section 6(k) requires the Forest Service to identify lands not suited for producing timber, "considering physical, economic, and other pertinent factors to the extent feasible.' Section 6(l)(1) requires representative information comparing timber sale, reforestation, and stand improvement costs with returns to the Treasury. Section 13(a) requires the Forest Service to identify the allowable sale quantity for timber, such that the production can be sustained in perpetuity. However, other resource management activities are not subject to comparably restrictive provisions. Amendments to NFMA could require: 1) equivalent determinations of land suitability for all management activities; 2) revenue-cost comparisons for each resource; and 3) goals for sustaining all outputs (including nonuse values) at levels which will not decline.

Option 2: **Broaden the information base.**

> **Congress could require the Forest Service to expand its inventory and analytical base for forest planning to include necessary information and models on all resources, on ecological interactions, and on social and economic impacts.**

NFMA planning has been conducted with few supplemental inventories, beyond those already in use in forest planning and management prior to NFMA. For example, the northern spotted owl was identified as a management indicator species for forest planning in western Washington and Oregon

in the early 1980s. However, the comprehensive inventory of owl populations and habitat was not begun until 1989, after the owl had been proposed for listing under the Endangered Species Act and after draft plans had been completed for many of the forests. The Forest Service has been conducting timber inventories for many years, with substantial statistical validity, and has numerous models for examining future stand conditions and related outputs based on current or proposed management activities. However, inventories for other resources and for ecosystem conditions are less complete and models are less fully developed. Similarly, the data and models for examining the economic consequences of management activities are more complete for timber outputs than for other outputs and conditions.

This is not to suggest that better data on resources, conditions, and trends will allow for correct, scientific management of the national forests. Forest planning is necessarily political, because the decisions and choices are about the future and what it should look like. Furthermore, information is expensive, and some data will always be imprecise. However, improved information and models can more accurately describe the current situation and how actions are likely to affect future outputs and conditions. This is as true for the economic and social effects of decisions as it is for the ecological aspects of land management. Information and models should also focus on public values-on outputs, conditions, jobs, the legacy we leave to the future, etc. Thus, public participation should help define what should be measured and what analytical tools are needed for forest planning.

Congress has provided little direction to the Forest Service on the kind of information required for forest planning and how to obtain it. NFMA established a number of analytical requirements, such as identifying lands not suited for timber production and determining the allowable timber sale level that could be sustained in perpetuity, which dictate certain analytical tools. However, NFMA contained no specific requirements on inventories; it only required the regulations to ‘‘provide for obtaining inventory data. ” Some analyses are implied by the various requirements, such as providing for biological diversity and prohibiting irreversible watershed damage. Congress has protected the Forest Service from judicial challenge to plans developed using inadequate, outdated information through a rider on the Forest Service appropriations for fiscal years 1988 and 1989.

Congress could direct the Forest Service to improve its inventory and analytical base for forest planning, to assure that the information and analysis responds to the public’s concerns in terms of national forest goals and direction, of opportunities and tradeoffs, and of management practices. Congress might also recognize the cost of acquiring additional information, since new inventories and tools can be expensive to develop, and a simple requirement for ‘‘adequate’ information could be subject to widely disparate interpretations. Some congressional guidance on the nature and purpose of information and analysis could assist the agency in determining, and the courts in assessing, the adequacy of the inventory and analytical base.

Option 3: Establish targets for all resources.

> Congress could require the forest plans to specify targets for all resource uses and outputs, nonuse values, and ecosystem conditions identified as important by the public in its participation in the planning process.

Congress intended the forest plans to set the direction for managing the national forests. Direction is, in part, described by the established short- and long-term goals. However, as discussed above, the information base and analytical tools emphasize physical outputs, and are fragmentary at best for nonuse values and for ecosystem conditions. While the public is interested in physical outputs, it is also concerned about nonuse values and about the long-term health of ecosystems. The emphasis on outputs contributes to conflicts over national forest planning, because the public wants goals established for all the uses and values of the forests and rangelands,

Congress could require the Forest Service to describe more fully the management direction for the national forests by identifying targets for uses and outputs, for nonuse values, and for ecosystem conditions in the forest plans. Identifying such targets will require development of relevant measures, especially for nonuse values and ecosystem conditions. Such an expanded information base might not be immediately implementable. Nonetheless, a broad array of targets is necessary to respond to the desires and interests of the American people.

Option 4: Improve public participation.

Congress could clarify the purposes for involving the public in forest planning, and could direct the Forest Service to improve its public participation processes.

Effective public participation in forest planning demands that the agency and the participants understand why participation is required. NFMA and the National Environmental Policy Act of 1969 (NEPA) helped to establish public involvement in agency planning and decisionmaking. However, the language in the laws requiring public participation in forest planning is ambiguous as to why the public should be involved. Therefore the agency and the public have differing and even opposing expectations about how public comments are to be considered and used in determining the future direction of national forest management. The imprecise guidance and contrasting expectations have heightened the conflict over national forest planning and management.

The Forest Service model of public participation also has hindered effective public involvement in forest planning. Many Forest Service managers approach public participation as an ''inform and educate' exercise--to learn what the various interests want and to inform them of what is feasible. This approach impedes effective participation, because the public is viewed merely as a source for establishing output goals, rather than as individuals and groups interested in all aspects of management. It also suppresses understanding and trust, because the individuals and groups are supposed to accept what the Forest Service determines is feasible, even though the information presented is often incomplete or too technical for many to comprehend. Furthermore, the agency often addresses the interests separately, which can lead to mistrust about what agreements have already been reached. Thus, the 'inform-and-educate model and meetings with separate groups hamper effective public participation in forest planning.

Congress could clarify the purpose for public participation in forest planning. NFMA could be amended to direct the Forest Service to use public involvement to build plans and decisions that are acceptable. Various tools could be employed, to assure effective involvement by the variety of individuals and groups interested in forest planning and management, including but not limited to formal and informal public gatherings, personal contacts, and alternative dispute resolution techniques. Congress could also strengthen the direction in section 14 of the Forest and Rangeland Renewable Resources Planning Act (RPA), as amended by NFMA, for using advisory committees, including an exemption from the Federal Advisory Committee Act, if deemed appropriate.

The Forest Service could also improve its public participation process by stressing the importance of building trust and consensus (or at least not opposition) among the various interests. The Forest Service recognizes the widespread dissatisfaction with the current process, and currently has an employee training course that seems to build on this concept of public involvement. Nonetheless, the Forest Service must assure the public and its employees that the process is intended to build local agreement on how the national forests should be managed.

Option 5: Expand use of information technologies.

Congress could direct the Forest Service to broaden the variety of technologies used for information collection, analysis, coordination, and presentation to be sure that both spatial and temporal aspects of forest management are adequately addressed.

The Forest Service, in 1979, designated FORPLAN as its principal tool for national forest planning. FORPLAN (and linear programming in general) is useful for organizing data and analyzing the temporal aspects of forest outputs, but FORPLAN: 1) typically requires information on resource interactions that exceed the state-of-the-knowledge, 2) has limited capacity for analyzing spatial concerns, and 3) was built to be comprehensive--answer all relevant questions in one model—and thus often defies understanding by the public and even planners. IMPLAN (and input-output models in general) is useful for examining the economic consequences of plan alternatives, but the nature of the data and the model lead to a fuller picture of the impacts on the timber industry than on other industries.

Congress could direct the Forest Service to improve its use of various planning technologies. FORPLAN, or a comparable tool, is probably necessary to address temporal concerns, such as sustainable output levels, but could be simplified by

separating distinct issues for analysis with different versions of the model. Despite the extreme cost of geographic information systems, such a spatial tool is probably necessary to address spatial concerns, and would be most useful if linked to FORPLAN. The Forest Service could also be directed to emphasize research on models for spatial and temporal resource interactions and on more complete models of economic and social impacts. The Forest Service could be directed to improve the coordination of data collection and storage, to build a historical record for forest planning and to contribute to an integrated Renewable Resource Assessment. Finally, the Forest Service must recognize that the various technologies are intended to support and assist in building acceptable plans and decisions, not to provide a definitive answer that must simply be accepted.

FOREST PLAN IMPLEMENTATION

Finding 2: Monitoring of Forest Management Activities Is Inadequate

National forest plans have been developed with enormous expenditures of Federal and public time and effort, but it is uncertain how effectively those plans are being implemented. To date, monitoring has been inadequate to evaluate national forest planning and management.

The inadequate monitoring results, in part, from the inadequate base of information on resource uses and outputs and ecosystem conditions of forests and rangelands. For example, it is impossible to monitor changes in ecosystem conditions that result from forest planning direction or from management activities without baseline information on preexisting conditions. On the other hand, monitoring could help establish baseline data needed for forest planning. Thus, inadequate inventories and inadequate monitoring are part-and-parcel of the same problem, and both must be improved to provide an adequate picture of the forest and rangeland resources and ecosystems.

Inadequate monitoring also results from the lack of incentives to monitor, or more precisely, from the lack of penalties for not monitoring. Forest supervisors are evaluated largely on achieving the easily measurable annual outputs specified for their forests—the "hard' targets, such as timber sale targets-and on spending money as appropriated. Timber sale outputs and expenditures are important, but the lack of monitoring of other plan objectives permits achieving other activities and goals to be postponed and could allow resource and ecosystem conditions to deteriorate. Monitoring that shows degrading conditions or unbalanced achievement of plan objectives would not only reflect poorly on the agency and its managers, but would also provide the public with information that could be used to challenge activities and practices. Thus, the agency has a distinct disincentive to monitor the implementation of the forest plans.

Plan Implementation Options

Monitoring is an essential part of strategic planning for the national forests. Monitoring serves three purposes. First, monitoring demonstrates whether the management activities on the ground are consistent with the direction established in the forest plan. Second, monitoring demonstrates if the results of those activities achieve the goals identified in the plan. And third, monitoring demonstrates the accuracy of the assumptions and values used in the plan. Through such demonstrations, monitoring provides the feedback needed to revise the plans and management activities and to assure that the national forests are being managed to meet the needs of the American people. Several options could improve monitoring of forest plan implementation.

Option 6: Separate the monitoring function.

> Congress could establish monitoring of forest plans as a separate Forest Service activity, **with** specified purposes and reporting.

Current Forest Service planning regulations (36 CFR 219.1 l(d)) specify that the forest plans must identify the monitoring and evaluation requirements needed to evaluate management activities. While the plans all appear to contain monitoring sections, no sanctions exist for incomplete or inadequate monitoring. Furthermore, monitoring and reporting might demonstrate that activities are inconsistent with the direction established in the plan, that the outputs vary from the planned goals, or that the assumptions upon which the plan is based are incorrect. In addition, monitoring must compete for funding with other activities, such as planning and output production. Thus, monitoring is generally the first activity to be eliminated or reduced when funding is less than the level specified in the forest plan.

Congress could establish monitoring and reporting as a distinct Forest Service responsibility, much as it did with integrated land and resource management planning. The Forest Service had conducted planning before the enactment of RPA and NFMA, but Congress specified standards for national forest planning, such as an interdisciplinary approach, periodic revisions, specific considerations, and public participation. Congress similarly could require an annual monitoring report, prepared by an interdisciplinary team, with specific requirements and public participation. (The following options discuss these latter aspects.) This would recognize the importance of monitoring, and might reduce the likelihood of curtailing or eliminating monitoring due to insufficient time or money.

Option 7: Require linkage between actions and results.

Congress could require the Forest Service to identify, in an annual report for each national forest, the results of activities in terms of the outputs and conditions identified as goals in the national forest plans, and in terms of public participation in the planning process.

The Forest Service currently is required to prepare a national annual report on its activities as part of the RPA planning process. However, as described in the OTA study, ***Forest Service Planning: Setting Strategic Direction Under RPA,*** the agency's annual report provides an incomplete picture of outputs and condition changes in the national forests. Timber sales and harvests, recreation use, and other uses and outputs are often identified, but the measures for some resources are merely rough estimates. The report more typically identifies management activities, but the activities are not related to the conditions supposedly being managed; for example, range, watershed, and wildlife habitat improvement efforts are reported, but the agency lacks measures (quantitative or qualitative) to show the resulting improvements in range condition, watershed condition, or wildlife habitat condition.

Comparable annual reports are not required as part of NFMA planning, although many forests produce them and the Forest Service has recently proposed annual reports for each national forest. An annual report could be useful internally, for evaluating the performance of forest supervisors and their staffs, and externally, for informing the public about the results of management. However, to be effective for such uses, an annual report must demonstrate how on-the-ground activities meet the output and condition targets specified in the forest plans. Because of concerns about the community impacts of national forest management, an annua1 report might also identify relevant changes in local employment that result from management activities.

An annual report on national forest management could also include an evaluation of public participation. Some have suggested that managers should be rewarded for resolving administrative appeals and lawsuits over forest plans and over activities to implement the plans. Resolving issues locally is generally desirable, and a declining number of appeals and lawsuits would indicate success in such efforts. However, some conflicts cannot be resolved locally, while others may be reduced by postponing decisions or by directing the decision to another forum. Thus, additional measures of effective local public involvement in forest planning and management are needed to evaluate fully managerial performance in public participation responsibilities.

Congress could require an annual report from each national forest to provide relevant information for internal and external reviews that would complete the feedback necessary for strategic national forest planning under NFMA. Measures for comparing annual performance with output and condition targets identified in the plan could be required, and reporting on the local economic impacts of management and on public involvement could also be specified.

Option 8: Require public involvement **in monitoring.**

Congress could direct the Forest Service to include public participation in the monitoring of forest plan activities.

The public is interested in national forest management, is involved in national forest planning, and is concerned about the results of management activities. Simply reporting on results is feasible, but places the public on the outside, rather than making them participants in planning and management. Congress could specify that the Forest Service include public participation in the monitoring of forest plan activities.

Including the public in monitoring could fulfill several purposes. As described above, monitoring assures **that** activities conform with the direction in the plan. However, different individuals can read the same statements describing direction, and reach different conclusions about what activities are consistent with that direction. Public involvement in monitoring provides feedback to the agency on how the public interprets the plan's direction. Significant differences in interpretation would suggest that a plan needs to specify the management direction more clearly.

Monitoring is also intended to assess whether the results of activities achieve the goals identified in the plan. Public participation in monitoring can help assure that the Forest Service focuses on the outputs, sites, and other values that are important to various interests. Monitoring all results of management activities on all sites is expensive, time-consuming, and probably impossible in a practical sense. Thus, monitoring is necessarily limited. Involving the public can assist the agency to focus on the key concerns, to guarantee that the most important outputs and conditions are measured most carefully.

Finally, public involvement in monitoring can also save money. Many individuals and groups who participate in planning have expertise that could be used to conduct some monitoring activities. Having a variety of interests involved can provide a balance of views and checks to assure that measurements are comprehensive and accurate. In this way, the Forest Service can build trust between the employees and the public, and among the disparate stakeholders in national forest planning and management. However, Forest Service managers must still be responsible for measuring the results of activities in the national forests and for implementing the forest plans.

FOREST SERVICE BUDGET RECONCILIATION

Finding 3: Budget Decisions Overwhelm Planning Decisions

The annual Forest Service budget request and the subsequent appropriations from Congress are inconsistent with the budget levels and mixes assumed in national forest planning. This occurs, in part, because the forest plans establish an integrated, coordinated approach to land and resource management, but the budget request and appropriations are arranged by resource activity. Budgets for multiple-use management at the forests must be translated into resource-oriented budgets, and these resource budgets are then modified by the Washington Office of the Forest Service, the Secretary of Agriculture, the Office of Management and Budget, and the House and Senate Committees on Appropriations to meet their political needs and responsibilities. The result is congressional appropriations that bear little resemblance to the coordinated budgets needed to implement the integrated land and resource management plans.

The difference between forest plan budgets and annual appropriations also results from the variety of budget assumptions used in forest planning. One regional office restricted the budget increases which could be assumed in forest planning, but others permitted unrestricted and often unrealistic budget increases to achieve all the goals desired by the public. Such plans can seem ideal to the public, so long as no one is clearly responsible for paying for the plan. The differences in budget assumptions in forest planning prevent the Forest Service from developing a budget request directly from the forest plans.

When congressional appropriations conflict with forest plan directions, the budget decision is invariably followed, because Forest Service employees are responsible (some are personally liable) for assuring that money is spent as Congress directs. Thus, appropriations by resource activity-not the forest plans-essentially control the management activities in the national forests. Furthermore, the annual appropriations have specified Forest Service timber sale targets, typically in excess of the administration's request (although below the potential identified in forest plans with unrestricted budgets), and these congressional timber targets determine national, and ultimately local, management priorities. The appropriations have not included targets for other resource outputs or for resource conditions and, thus, have contributed to the Forest Service's emphasis on timber outputs. (See ''Finding 1: Emphasis on Timber and Other Physical Outputs. '

Finally, the Forest Service has a number of special accounts and trust funds, comprising about a third of the Forest Service budget. The largest is Forest Service receipt-sharing payments to counties, with payments often exceeding $300 million annually. However, the Knutson-Vandenberg (K-V) Fund, the

Timber Salvage Sale Fund, brush disposal, and other special accounts and trust funds generate at least $500 million annually for Forest Service activities. These funds result mostly from timber harvests, but the expenditures commonly are not limited to timber sales or investments. Thus, the counties (through the receipt-sharing payments) and the managers of most resource programs (through available budgets) benefit from increasing timber sales, again contributing to the emphasis on timber outputs. Furthermore, many of these special accounts and trust funds are permanently appropriated, with the money automatically available unless Congress halts or restricts the expenditures. Congress has given relatively little attention to these funding sources, and their use has become increasingly important as the Federal budget problems have mounted.

Forest Service Budget Options

***If* the** forest plans are to be implemented, the planning process must be integrated with the budget and appropriations process. The budget process must provide balanced consideration of all the resource output and condition goals of the forest plans. Congress needs information on the opportunities for improving management with additional funding, but Congress and the public also need to know how the forests will be managed if the desired funds are not available. Furthermore, the Forest Service needs flexibility to implement the forest plans, but Congress needs to exercise its control to assure that national forest management fits within the overall spending and taxing priorities demanded by the public. Congress has several options for integrating and balancing the planning and budgeting processes and for providing the necessary flexibility while retaining appropriate control.

Option 9: Eliminate appropriations by resource.

Congress could appropriate funds by management activity, rather than by resource line items, and direct the Forest Service to develop its budget accordingly, based on the activities needed for implementing the forest plans.

Forest Service budget requests and congressional appropriations are currently arranged in about 60 line items, specifying expenditures for various resource activities, such as timber sale preparation and administration, wildlife habitat improvement, and trail maintenance. Proposed funding for each resource activity is adjusted at each step in the budget process—by the Washington Office of the Forest Service, the Secretary of Agriculture, the Office of Management and Budget, and the House and Senate Committees on Appropriations-to meet their own needs and responsibilities. The eventual appropriations by resource rarely mesh with the funding needed for integrated, multiple-use management under the forest plans. Furthermore, the resource-oriented appropriations also encourage the administration and Congress to specify output targets, especially for timber, since timber targets are easily specified and are more controllable by Forest Service managers.

A related problem is that, under resource-oriented appropriations, other necessary activities are either unfunded or must be conducted with funds intended for resource management. Planning, and the requisite training and software development and acquisition, has been funded largely by resource-specific appropriations. Monitoring is typically conducted by the resource specialists for the resource being monitored, but does not provide tangible results for which the resource managers can be rewarded. When combined with the lack of penalties for inadequate monitoring, it is not surprising that monitoring has a low priority within the agency. Thus, although planning and monitoring are essential to effective national forest management, funding for these activities must be diverted from the various resource activity appropriations.

Congress could replace the resource-oriented appropriations with appropriations for the activities necessary for managing the national forests—planning, implementing, and monitoring. These major categories could be further subdivided, to provide Congress with more control over the agency's budget. For example, planning could be divided into inventories and data management, technology acquisition and development, personnel development, public involvement, and plan preparation (writing and reproducing). Similarly, monitoring could be divided into on-site measurement, equipment purchases, personnel development, public involvement, and report preparation. Implementation could be subdivided into ongoing activities and investments, with ongoing activities including use and output production and control, and maintaining current resource, ecosystem, and facility conditions. Investment categories could include roads, trails, and facilities to increase or control uses and outputs, and

administrative facilities. Resource, ecosystem, and facility rehabilitation to improve current conditions, such as reforestation or trail reconstruction, could be identified as either ongoing activities or as investments.

Reorganizing the Forest Service budget would not eliminate the agency's responsibility to provide information on the anticipated uses and outputs and on the likely changes in resource, ecosystem, and facility conditions at the requested budget level (and with increases or decreases in the budget). The Forest Service could also be required to provide unit cost information for important activities, such as successful reforestation, road construction, and recreation facility operation. Nonetheless, such reorganization of the budget and appropriations structure could allow Congress to retain control over important decisions (e.g., the level and location of investments), could assure adequate funding for necessary activities (e.g., planning and monitoring), and could provide the Forest Service with the flexibility to implement the forest plans,

Option 10: Require realistic budgets in forest plans.

Congress could direct the Forest Service to include a range of budget possibilities, from the current forest budget to an unlimited increase, in the final plan for each national forest.

The Washington Office of the Forest Service provided no direction on the budget assumptions to be used in national forest planning. One region restricted the budgets that forests could assume in planning but most did not. Budget restrictions are more likely to result in forest plans that are implementable, i.e., within the realities of Federal budget limitations. However, such restrictions also prevent the forests from identifying opportunities for improving national forest management and for generating additional revenues through increased budgets. This has placed forests with restricted budget assumptions at a disadvantage in annual internal budget negotiations.

While unrestricted budget assumptions have allowed forest and regional personnel to identify opportunities for investments under increased budgets and are more acceptable to the public (because more uses and outputs can be accommodated while maintaining or improving resource and ecosystem conditions), such forest plans may be unimplementable. Conditions may deteriorate and/or the uses and outputs must be at lower levels than planned, increasing the likelihood of challenges in administrative appeals or litigation.

Both types of information---+pportunities with unrestricted budgets and likely management with budget limitations-are necessary in forest planning. Unrestricted budget opportunities are important to demonstrate how management could be improved, and an analysis of opportunities is required in the RPA Assessment. However, the administration and Congress are facing increasing pressures to reduce the Federal budget and, thus, substantial budget increases are unlikely. Congress and the public need to know how the forests are likely to be managed under limited budgets. Congress could require the Forest Service to include both types of information in forest plans, thereby linking the forest plans with opportunity analysis in the RPA process and providing information on the likely management direction and the near-term outputs and conditions in the national forests.

Option 11: Control special accounts and trust funds.

Congress could require **more complete reporting on the sources and uses of money in the various special accounts and trust funds, and** could clarify the purposes for which the funds could be used.

The Forest Service presents little information on the sources and uses of money in the various special accounts and trust funds. The budget request contains aggregate information on the expected receipts and expenditures from each fund, but with little or no discussion of the purposes or locations of the expenditures. The annual ***Report of the Forest Service*** presents information on reforestation and timber stand improvement under the K-V Fund and on road construction and reconstruction using purchaser road credits, but not on revenue-sharing payments, the Timber Salvage Fund, the Working Capital Fund, brush disposal, or other permanent appropriations. The Timber Sale Program Information Reporting System (TSPIRS) also includes K-V Funds and purchaser road credits, and adds the Timber Salvage Fund, but excludes brush disposal and road maintenance deposits from timber purchasers. The forest plans, and the RPA Program, do not

distinguish funding and activities under any special accounts or trust funds.

The special accounts and trust funds provide about a third of the Forest Service budget annually, but with the sparse information available, Congress is unable to exercise much oversight and control over their use. Some have specified funding levels: revenue-sharing is 25 percent of gross receipts, and the Reforestation Trust Fund receives up to $30 million annually from tariffs on wood product imports. However, deposits to most of the accounts are at the discretion of the Forest Service at the local level. An unlimited portion of timber receipts can be deposited in the K-V Fund. If the Forest Service designates a sale as a salvage sale, because it contains some (unspecified) volume of dead, dying, or threatened timber, the remaining timber receipts can be deposited in the Timber Salvage Fund. The level of brush disposal and other cooperative deposits is also at the discretion of the Forest Service. Thus, the Forest Service has substantial local authority to determine the amount of money deposited in the various special accounts and trust funds if the forest has timber to sell.

The Forest Service also has substantial discretion over the use of the special accounts and trust finds. Several accounts (K-V, salvage, brush disposal, and other cooperative deposits) are to be used on the national forest that generated the deposits, although some funds are used for regional and Washington Office staff. Most accounts have specified purposes: salvage funds are to prepare and administer new salvage sales; the Reforestation Trust Fund is for reforestation and timber stand improvement; brush disposal and other cooperative deposits are for the purposes specified in the contractor agreement. The Forest Service has relatively broad discretion over the use of the K-V Fund-it can be used for reforesting cutover sites, for improving timber stands, or for mitigating and enhancing other resources within the timber sale area. To date, no studies have examined whether the level or use of the special accounts and trust funds are consistent with congressional intent.

Congress could require the Forest Service to present more information on the sources and uses of monies in the major special accounts and trust funds in the budget request, the RPA program, the forest plans, and the annual reports. Congress could also examine the use of special accounts and trust funds, through oversight hearings and/or review by the General Accounting Office, to assess whether the use of the funds is consistent with the original intent and with forest planning. Congress could also clarify the purposes for which the funds could be used, to assure that the special accounts and trust funds are used in a manner that is consistent with the direction set forth in the forest plans.

Option 12: Compensate counties equitably.

Congress could replace the current program of returning 25 percent of gross Forest Service receipts with a system to compensate counties fairly for the tax exempt status of Federal lands and activities.

Since 1908, the Forest Service has returned 25 percent of its receipts to the States for use on the roads and schools in the counties where the national forests are located. The payments were clearly intended to compensate the counties for the tax exempt status of the national forest lands, but the legislative history provides no explanation of why compensation of 25 percent of receipts was deemed appropriate. In 1976, NFMA expanded the definition to include K-V Fund deposits and timber purchaser road credits as gross receipts, because the Forest Service had been diverting an increasing share of receipts to "internal management purposes" (reforestation and road construction), and thereby reducing the basis for county payments. Receipt-sharing is akin to an ***ad valorem*** severance or yield tax, which some jurisdictions use to tax private timberland owners. However, it is unclear whether Forest Service receipt-sharing approximates common severance or yield tax systems, and in some States, purchasers also pay yield taxes on their harvests of Federal timber.

A second program, enacted in 1976, compensates counties for the tax exempt status of Federal lands. The Payments in Lieu of Taxes (PILT) program, administered by the Bureau of Land Management, generally provides an annual payment of $0.75 per acre for entitlement lands (which include most National Forest System lands), although the total payments are limited by the population in the county. PILT payments are also reduced by compensation under other programs, such as Forest Service receipt-sharing payments, to a minimum of $0.10 per acre per year. Thus, in areas where Forest Service payments exceed $0.65 per acre, the counties receive

$0.10 per acre under PILT and the full Forest Service payments. In areas where Forest Service payments are less than $0.65 per acre, the counties receive $0.75 per acre on average under the two programs. (The offset to PILT payments lags behind changes in Forest Service payments, and thus county compensation could be above or below $0.75 per acre in any given year, but will average $0.75 per acre.) The PILT payments have not changed since the program was created, and thus compensation in real dollars is currently less than half of what Congress enacted in 1976.

It is unclear whether the combination of Forest Service receipt-sharing and Bureau of Land Management PILT payments is equitable compensation for the tax exempt status of national forest lands. In some areas, the counties may receive payments that exceed what collections from a private owner of undeveloped land might be, but in other areas, the counties might be undercompensated. Timber generally accounts for at least 90 percent of Forest Service receipts, and in heavily timbered areas, Forest Service payments can be substantial. Many counties rely on Forest Service payments for substantial portions of their budgets, but the agency does not regulate the timing of harvests, and, thus, receipts and county payments vary as timber harvests fluctuate. Timber receipts fluctuate widely, rising or falling by 50 percent or more from year to year because of changing market condition. Furthermore, PILT payments require annual appropriations from Congress, and while Congress has not failed to appropriate the full authorization, Federal budget constraints could force reductions in PILT payments. Counties, therefore, must depend on unpredictable sources that might be compensating them less than a private landowner would.

Congress could replace the current system of receipt-sharing and PILT payments with a system that fairly and consistently compensates the counties for the tax exempt status of national forest lands. Such compensation would reimburse States and counties for lost property taxes, sales taxes, income taxes, and/or yield taxes, depending on existing tax structures, and the basis could vary by county or by State. Congress could require a study, by the General Accounting Office or some other agency, to devise the appropriate compensation methods and levels, and then could replace the current system with the new tax-equivalency compensation system.

FOREST PLANNING DIRECTION

Finding 4: National Targets Can Nullify Local Decisions

RPA established a national strategic planning process for renewable resources under which the Forest Service is to assess opportunities and capabilities, develop a long-term agency program, coordinate that program with annual budgets, and report annually on progress in implementing that program. RPA also established a local planning process for preparing land and resource management plans for the national forests, and NFMA amended RPA to provide substantial guidance on considerations and requirements for the local planning process. Congress may not have envisioned a close union between the local and national planning processes, but they have evolved toward closer coordination. The Forest Service describes the connection as an iterative process, with information on capabilities and opportunities flowing into the RPA Assessment, and quantitative national targets from the RPA Program being allocated to the forests.

Allocating national RPA targets to the national forests can negate local agreement about the appropriate management direction for a national forest. Allocated targets may be technically infeasible, because a comprehensive, national analysis necessarily aggregates information on local capabilities, and loses the site-specific interactions and constraints. Furthermore, the RPA Program is subject to national political pressures, from within the administration and from Congress and the many interest groups, that may be insensitive to local demands and capabilities. Thus, national goals can be infeasible to achieve on the ground. In addition, because of existing inventories and analytical tools, targets focus on annual physical outputs, especially timber outputs. Allocated timber targets from RPA (or from the annual appropriations), even if technically feasible, can substantially alter the national forest management direction, determined with considerable local analysis and public involvement.

Planning Direction Options

To implement national forest plans that are acceptable to the public, the NFMA planning process must be coordinated with the RPA planning process by maintaining a continuous, multidimensional exchange of information on current situations,

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capabilities, and opportunities-including physical and political potentials and limitations. National direction for forest planning is needed to assure adequate consideration of regional, national, and global problems and concerns. However, only local analysis can determine physically and politically feasible solutions.

Option 13: Specify forest plans as the baseline **for RPA planning.**

Congress could require the Forest Service to use the management direction established in the forest plans as the baseline for National Forest System outputs and values in the RPA planning process.

The Forest Service envisions an iterative NFMA planning-RPA planning process, with the forest plans providing information for the RPA Assessment and the RPA Program establishing targets for the National Forest System. Clearly, the forest plans can contribute data on the current situation, and on the capabilities and opportunities for the forests to provide outputs and other values-data which are essential to an assessment of the renewable resource situation in the United States. However, national analyses of management options can overestimate production possibilities, because site-specific interactions and constraints cannot be maintained in such analyses. Therefore, national output targets allocated to the forests may be technically infeasible to implement.

Alternatively, Congress could direct the Forest Service to use national forest plans as a technically and politically feasible baseline for outputs and values from the National Forest System, particularly if a consistent range of budget possibilities is required in forest planning. Then, in RPA planning, the Forest Service could compare the baseline National Forest System production and the expected private and other public production with the demand projections, to determine likely shortfalls, unacceptable price increases, and/or deteriorating conditions. The RPA Program could examine alternatives to address these identified problems—by increasing National Forest System budgets, by expanding research, and/or by bolstering financial and technical assistance to States and to private landowners. If regional, national, or global concerns cannot be adequately addressed under such alternatives, the RPA Program could provide direction for additional issues to be considered as forest plans are revised. If the problems are near term, the Program could direct immediate analyses of potential plan amendments or revisions to address the problems. However, Congress could specify that any RPA Program direction for the National Forest System be consistent with locally developed forest plans and with public participation to assure that the direction is acceptable.

Option 14: Require RPA direction for all resources **and all branches.**

Congress could require the Forest Service to provide targets and/or national direction for all outputs and values and for all branches of the agency.

The RPA Program has traditionally established physical output targets, principally because the available information and analytical tools focus on physical outputs. It is admittedly difficult to establish goals for values other than annual physical outputs, particularly when the inventories and analytical models concentrate on outputs. Nonetheless, the emphasis on physical outputs from the national forests has impeded consideration of ecosystem sustainability.

The RPA Program has also focused on the National Forest System. The Program typically sets the direction for Research and State and Private Forestry by simply extending and expanding the size and structure of current activities. In contrast, targets for the National Forest System are driven by the desire to alleviate demand-supply imbalances for the various resources through national forest management. This focus largely reflects the ability to hold forest supervisors and other line managers accountable for achieving physical output targets, whereas researchers and employees providing financial and technical assistance are not clearly responsible for producing outputs. However, this focus has led to an emphasis on the National Forest System lands and outputs, which exceeds their importance in the Nation's land and renewable resource base.

Congress could improve the balance among resources and among Federal and non-Federal lands by directing the Forest Service to establish direction for agency programs to address all the outputs and values on all forests and rangelands. The Forest Service could be directed to emphasize financial and technical assistance to alleviate regional demand-supply imbalances for marketed outputs and values,

and to focus on Federal and other government lands for demand-supply imbalances of unmarketed outputs and values. Congress could require RPA Program direction, for all the branches of the Forest Service, to be defined in long-term goals for productivity and ecosystem health and in short-term targets for outputs and conditions of concern.

SUMMARY AND CONCLUSIONS

Congress, in enacting NFMA, envisioned an open planning process for establishing national forest management direction acceptable to the public. To date, national forest planning has not fulfilled this vision, and national forest management seems to be as controversial now as when NFMA was enacted. Most plans and many actions under those plans have been appealed, and lawsuits have focused national attention on Forest Service land and resource management. Some argue that the planning process has become so controversial and burdensome that NFMA should be repealed, while others have proposed modifications emphasizing various aspects of plan implementation.

OTA found a number of problems in national forest planning. The plans focus on producing timber and other physical annual outputs, because of an emphasis on outputs in the legislative guidance, in the inventories, and in the analytical technologies. Outputs from the national forests are clearly important, but sustaining the ecological health of the national forests is paramount. The national forests are, in many ways, comparable to a trust fund, intended to produce annuities from assets. Annuities are desirable, but maintaining and enhancing the assets is crucial to perpetuating the annuities. In national forest planning, inventories, analyses, and targets too often emphasize the outputs (the annuities) and discount the ecosystems (the assets).

The focus on physical outputs could be overcome, if the environmental and economic consequences of planning and management were assiduously monitored. However, monitoring has been insufficient to evaluate national forest plans and management. Efforts to produce outputs or, in some cases, the agency's failure to act could be degrading the nonuse values and the productive assets of the national forests, but the monitoring needed to assess such changes is not being done. Monitoring can determine: 1) if the activities are consistent with the direction established in the plans; 2) if the results accomplish the plan's objectives; and 3) if the assumptions and models used in the planning process are accurate. To date, monitoring of national forest plans and their implementation has not achieved these purposes. The lack of monitoring results, in part, from the inadequate information base. More importantly, however, monitoring is fragmentary because there are no incentives to monitor, and no penalties for managers for not monitoring.

Direction-setting at the national level has also emphasized annual timber and other outputs, although better integration of forest plans in the RPA planning process could help to protect nonuse values and long-run ecosystem health. The resource-oriented budget process and the numerous special accounts and trust funds (which are funded principally through timber sales) contribute to the focus on timber and other outputs. Furthermore, RPA planning was intended to be a strategic process for all renewable forest and rangeland resources, but has emphasized timber and other outputs from the national forests, again because better information and analytical tools exist for timber and other annual outputs than for ecosystem conditions. Unless closely coordinated with the forest plans, national output targets from the annual appropriations or from the RPA planning process can overwhelm the technically and politically feasible decisions produced locally, through substantial analysis and public participation.

Despite these problems, NFMA planning can fulfill the strategic process envisioned by Congress. Clearer legislative direction, a broader information base, targets for ecosystem health as well as for annual outputs, more effective public participation, and a variety of analytical technologies could lead to technically and politically feasible national forest plans and management. Distinguishing and organizing monitoring, linking activities to results, and involving the public in monitoring can assure that forest plans are implemented. Appropriations by management activity, realistic budget assumptions in forest plans, better accounting for special accounts and trust funds, and fair compensation to counties for the tax exempt status of Federal lands could lead to Federal financing consistent with the forest plans and overall Federal budget constraints. Finally, a more interactive RPA-NFMA planning process, with forest plans as the baseline for the National Forest System and with long- and short-

term direction for all resource values and all branches of the agency, can result in a national direction that can be achieved through national forest planning and other Forest Service activities. These changes can complete the strategic planning process for the national forests that was begun with NFMA and has been evolving under Forest Service leadership.

Chapter 3

The Goals of National Forest Management and Planning

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Chapter 3
The Goals of National Forest Management and Planning

Beginning in 1975, Forest Service timber sale practices were successfully challenged in several lawsuits (the first and best known being the "Monongahela Decision'), on the grounds that the agency was violating specific provisions of the 1897 Forest Service Organic Act. The Forest Service argued that scientific evidence and 70 years of experience justified their practices, but the court held that only Congress could change the legal restrictions on selling timber. In the National Forest Management Act of 1976 (NFMA), Congress eliminated the restrictive provisions of the 1897 Organic Act, provided substantial guidance to the Forest Service for preparing land and resource management plans for units of the National Forest System, and required public participation in determining management direction. It was hoped that an open planning process could resolve local controversies at the local level, and get Congress and the courts out of local, detailed national forest management.

To date, Forest Service planning under NFMA has not fulfilled this vision. Controversy, litigation, and congressional involvement abound in management of the national forests. In the South, clearcutting is prohibited near red-cockaded woodpecker colony sites in the national forests. Administrative appeals in the northern Rocky Mountains have delayed enough timber sales to cause a timber supply squeeze for some sawmills. A Wyoming sawmill sued to try to guarantee minimum Forest Service timber supplies under a timber management plan, but lost and was subsequently closed. Controversy over road construction has led Congress to consider, and sometimes to enact, substantial changes in road construction appropriations (292).

The current forest management controversy with the greatest impact is over the national forests of the Pacific Northwest—how much timber to sell, and/or how much ancient forest to reserve from harvesting for the protection of the northern spotted owl and the old-growth Douglas-fir ecosystem. As plans for the national forests in western Washington and Oregon were being developed (long after the target date specified in NFMA), courts enjoined timber sales which might threaten the owl's existence. Congress acted to continue the timber sale program while the U.S. Fish and Wildlife Service considered protecting the owl under the Endangered Species Act. (The owl was subsequently determined to be threatened, according to the provisions of that act.) Courts have since ruled portions of the congressional intervention to be unconstitutional.

Some have characterized these problems as regional battles over the control of resources. In places where commodity production is being curtailed, some users, Members of Congress, and agency employees assert that national forest management is gridlocked. Congress has been asked to consider legislation to overhaul the system. Some proposals would prohibit clearcutting, others would add guidance on forest plan implementation, still others would prevent judicial review of Forest Service decisions. Some observers have suggested that many of the problems result primarily from the belief that NFMA planning could resolve controversies, and that repealing NFMA would resolve at least some of the current difficulties (18). Others go further, suggesting that the experiment in public land and resource ownership is a failure, and that radical reform of the system is the only solution (41). Nonetheless, many believe that the current planning process, with improvements, is still appropriate.

PURPOSE AND ORGANIZATION

These problems and proposals led Congress to ask OTA for an assessment of the technological, biological, social, and economic dimensions of the forest planning process established under NFMA. To assess these aspects of the NFMA planning process, one must first examine the purposes of national forest management: multiple use and sustained yield, as defined in law. These goals are examined from their historical development, from their philosophical basis, and from their implications for management.

[1] *West Virginia Division of the Izaak Walton League, Inc. v. Butz*, 367 F. Supp. 422; 522 F. 2d 945 (4th Cir. 1975).

After examining the management goals, this chapter describes the strategic nature of the NFMA planning process. Strategic planning is a useful standard for examining the NFMA planning process for two reasons. First, although Congress did not expressly create a strategic planning process for the national forests, national forest planning is part of the strategic planning process created in the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA).[2] Congress clearly intended the RPA process to be strategic planning (259), and thus implicitly intended strategic NFMA planning by making the land and resource management plans for the national forests a part of the RPA Program (section 6(a)).

Second, a public strategic planning process is an effective approach for identifying organizational goals for a government agency. NFMA established an open, public process for setting management direction for the national forests. Forest plans are to describe that direction by identifying goals for conditions and outputs, together with: 1) the standards and guidelines for management activities, 2) the proposed and possible actions, and 3) the financial resources necessary to fulfill those goals. Strategic planning is an appropriate criterion for assessing national forest land and resource management planning under NFMA.

The subsequent chapters of this report assess specific aspects of the planning process—legal context, social dimensions, biological aspects, planning technologies, economic considerations, and organizational characteristics. The principal criterion for examining these aspects is how they contribute to strategic national forest planning, both in theory and in practice. The last chapter concludes this assessment by reviewing the relationship between strategic NFMA planning and the Forest Service's national planning effort under RPA.

NATIONAL FOREST GOALS: MULTIPLE USE AND SUSTAINED YIELD

Historical Development

Creation of the National Forests

Numerous devastating natural disasters, often in conjunction with extensive logging, occurred in the United States during the late 1800s. Huge wildfires swept through logged-over lands in New England and in the Lake States in 1871, 1881, and 1891; the 1871 Peshtigo fire killed 1,500 people in Wisconsin (32, 200). Timber cutting on public lands was illegal, but the timber protection laws were routinely flouted (291). Furthermore, major floods of the late 1880s were blamed on widespread deforestation (190). These events led Congress, in 1891, to grant the President authority to reserve important public domain lands, but Congress did not authorize efforts to protect the reserves.

In 1897, in response to President Grover Cleveland's substantial forest reservations, Congress indirectly guided management of the forest reserves (renamed the national forests in 1907) by limiting the purposes for which the President could reserve forest lands. Reserves were to exclude lands more valuable for mineral extraction or for agriculture, and could only be established:

> . . . to improve and protect the forest within the boundaries, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States , . .

This was the principal congressional direction for the purposes of reserving lands and managing reserved lands, and has come to be known as the Forest Service Organic Act. The act also authorized the agency to regulate the "occupancy and use [of the reserved lands] and to preserve the forests thereon from destruction. '

[2]NFMA was substantially an amendment to the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA—Act of Aug. 17, 1974; Public Law 93-378, 88 Stat. 476; 16 U.S.C. 16001614). RPA, as enacted, required the Forest Service to prepare land and resource management plans for units of the Nationat Forest System, using an interdisciplinary approach to integrate physical, biological, economic, and other sciences. NFMA added substantial guidance for public participation and for relevant considerations in the planning process. These land and resource management plans are often called forest plans, and the process is typically called forest or NFMA planning.

[3]This section addresses the historical development of legislation providing the management goals for the national forests. Ch. 4 Will examine the detailed legal requirements of these laws.

The floor debate over this act strongly indicates that the primary intent was to protect the forests and the downstream water flows.[4] Wood was to be made available to settlers and to miners who needed the timber locally, but providing wood for loggers was not a consideration in establishing forest reserves. Senator John Lockwood Wilson of Washington noted:

> ,.. the timber lands withdrawn [that are more than 25 miles from Puget Sound] do not contain merchantable timber. They have only their value, if any, for mining purposes (326).

Senator George Laird Shoup of Idaho, in arguing for permission to sell timber from the reserves, added:

> . . . We do want to protect and will protect our timber if the reserves are only established in the right place. But, Mr. President, our farmers and our miners are entitled to a sufficient quantity of timber for domestic purposes (233).

Thus, Congress was clearly concerned about the local community impacts of reserving Federal forest lands. In the subsequent century, the national forests have become an important source of wood for the lumber and plywood needed in home building and other uses. Nonetheless, the principal concerns in establishing the forest reserves were for protecting the lands and waters while making a continuous supply of timber available.

Following the transfer of the reserves to the Department of Agriculture in 1905, the management activities of the new Forest Service (created when the Forestry Division of the Department of the Interior's General Land Office was merged with the Department of Agriculture's Bureau of Forestry) generally focused on land and resource protection. The first efforts were to protect the forests from wildfires and from trespass (illegal timber cutting and homesteading), and to control grazing, which had been unregulated by the Department of the Interior (329). The Forest Service based its efforts on the broad, general provision in the 1897 Organic Act permitting the Secretary of Agriculture ''to regulate their [the forest reserves'] occupancy and use and to preserve the forests thereon from destruction . . .'' The livestock industry challenged the Forest Service's right to regulate use and charge fees, but the agency's position was upheld by the U.S. Supreme Court in 1911 (240).

In 1911, Congress also authorized the Forest Service to acquire lands for the National Forest System. The Weeks Law authorized land acquisition to protect water flows; acquiring land to provide timber was not authorized until the Clarke-McNary Act of 1924. Many of the national forest lands in the eastern half of the country were acquired under the Weeks Law, and, unlike those in the west, many had been denuded or severely degraded before the Federal Government acquired them. Thus, in origins and biological and cultural histories, the eastern national forests are quite different from the national forests in the west.

In summary, the concept of using the national forests in many ways was implicit from the very beginning. When use levels were low, conflicts among users were minor and could be managed by separating uses. Public discussion of the compatibility of uses did not begin until after the National Park Service was created in 1916. In the following years, the Park Service tried, sometimes successfully, to gain control of prime Federal recreation sites. The Forest Service countered Park Service efforts by arguing that proper management of the various land uses could provide both recreation and commodity extraction, that ''multiple use' was preferable to ''single use. '

The Multiple-Use Sustained-Yield Act of 1960

The debate with the Park Service and disagreements with ranchers continued to simmer until about 1950. Then, during the next decade, several conditions and events led the Forest Service to believe in the need for legislative sanction to define the purposes of the national forests and to preserve Forest Service discretion in managing those lands.

The demand for the goods and services provided by the national forests began to change after World War II. Livestock grazing had been the major use of the reserves when the Forest Service began managing the lands, but livestock use of the national forests peaked in 1920 and has slowly declined since (298). In contrast, recreation and timber harvesting began slowly, then accelerated after World War II. (See box 3-A.) While timber harvesting increases some

[4] Typically, committee reports carry more weight as indicators of the intent of Congress than does the floor debate, but no committee reports were filed on the 1897 act, because it was an amendment to an appropriations bill. This was a common practice at that time, because the appropriations committees did not exist until the 1920s. Appropriations bills were developed by what are now known as authorizing committees.

Box 3-A—Livestock Grazing, Recreation Use, and Timber Production Trends in the National Forests

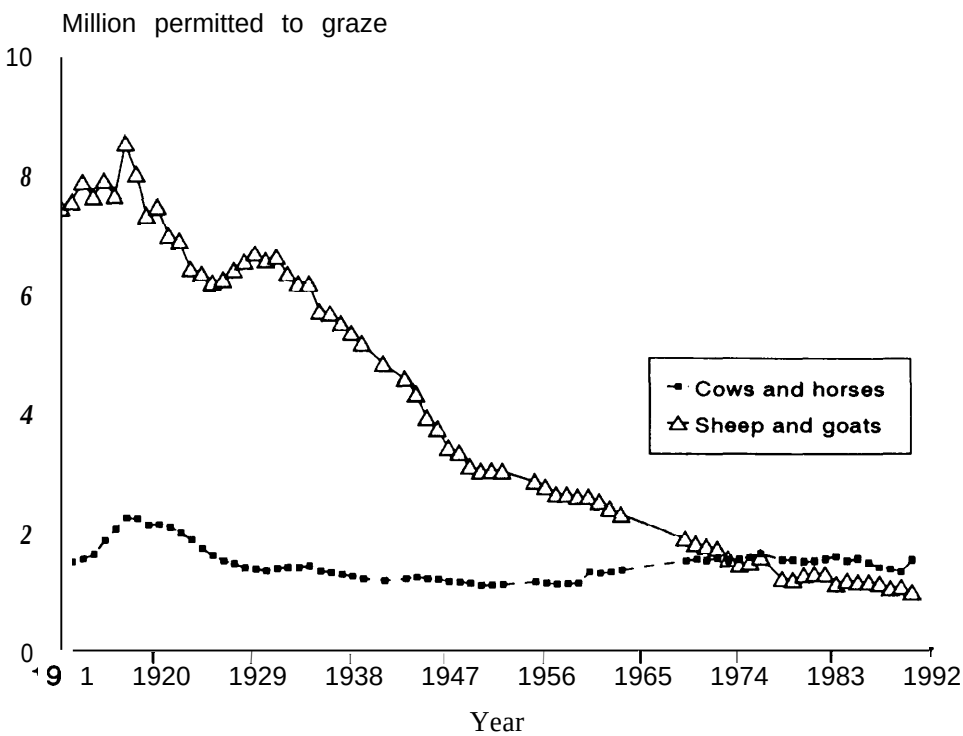
Livestock grazing was the most important use of the forest reserves **when the lands were transferred in 1905 from the Department of the Interior to the Forest Service in the Department of Agriculture. Livestock grazing continued to increase for the next 15 years, but has slowly declined since 1920. (See figure 3-l.)**

Recreation in America has undoubtedly increased since **World War II. (General recreation data are unavailable to show the magnitude or consistency of the increase.) National forest recreation use was generally below 10 million** visitors annually prior to 1946, but climbed to about 25 million in 1950, and rose to more than 100 million visitor-days by 1961.[1] Recreation use has continued to climb, exceeding 250 million visitor-days in 1989. (See figure 3-2.) This is not to suggest that all uses have increased equally. Motorized recreation, travel to destination resorts, and backcountry hiking increased as the Nation's transportation system improved, as leisure time increased, and as the Wilderness System expanded. However, demographic and other changes have shifted recreation uses toward shorter but more frequent and less strenuous activities (199, 235).

Timber harvesting in the national forests also increased substantially after 1950. Before World War II, national forest timber harvests averaged less than 1 billion board feet (BBF) annually. In 1950,3.5 BBF were harvested, and this rose annually, reaching 12.1 BBF by 1966. (See figure 3-3.) In contrast to the continued growth in recreation use, national forest timber sales and harvests have generally ranged between 9 and 13 BBF annually since 1960, with no discernible long-term trend. Lumber and plywood production has increased slowly over this period (see figure 3-4), suggesting that national forest timber displaced private and other public timber in the 1950s. Since 1960, harvests of private and other public timber may have fueled the increased production, but improved technology-greater product output from the same amount of timber input-has also contributed to the increased lumber and plywood production.

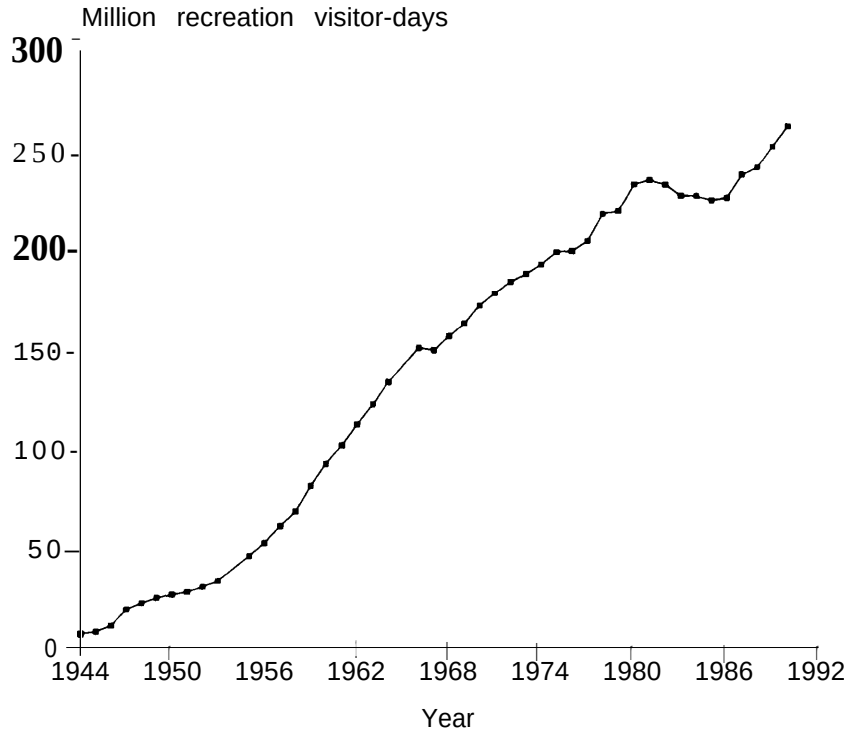
[1]Recreation use was measured in visits prior to 1965, and has been measured in visitor-days since 1%5. However, the change in measure is apparently insignificant for reporting the treads in recreation use, as * in figure 3-2 (74).

Figure 3-l-Grazing in the National Forests



SOURCE: U.S. Department of Agriculture, Forest Service, *Report of the Forest Service* (Washington, DC: U.S. Government Printing Office, annual series).

Figure 3-2—Recreation Use of the National Forests



SOURCE: U.S. Department of Agriculture, Forest Service, *Report of the Forest Service* (Washington, DC: U.S. Government Printing Office, annual series),

recreation opportunities it limits other opportunities and values. The simultaneous increase in the Forest Service timber program and in national forest recreation use in the 1950s and early 1960s probably magnified the conflicts over national forest management.

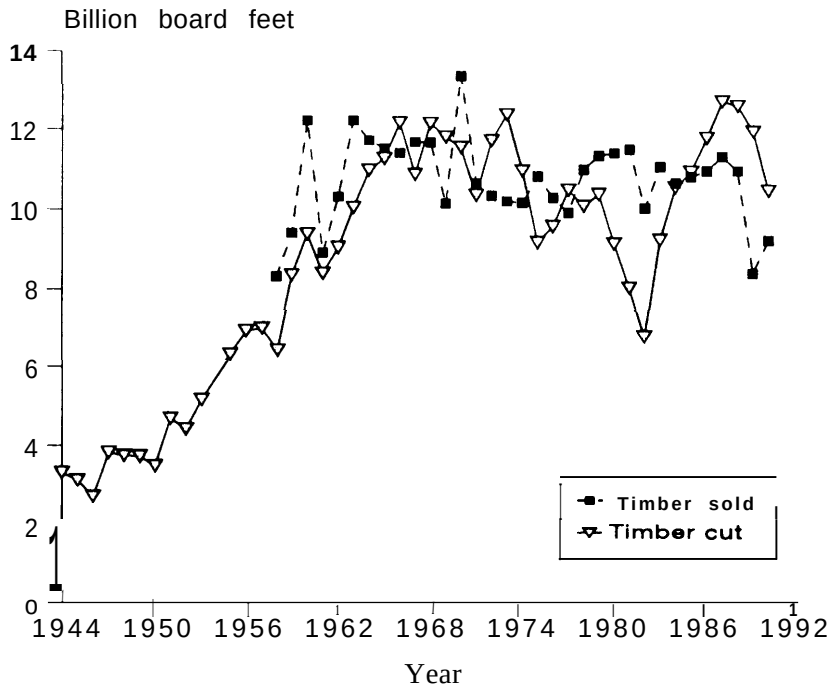
Ranchers tried to increase their influence in determining livestock permit numbers, fees, and other matters, and convinced Senator Frank Barrett of Wyoming to introduce a bill to this effect in 1953 (329). In the same Congress, the timber industry pushed for industry selection of public timberland as compensation for private timberland flooded by Federal dam projects (329). Although these efforts were unsuccessful, they indicated an interest in partitioning the national forests among interest groups.

Another effort to reduce Forest Service discretion began in 1955: the first bill to establish a wilderness system was introduced. The Forest Service was surprised by the bill, because it had administratively established a system of wilderness, wild, and primitive areas in the National Forest System, beginning in 1924. However, administrative boundary modifications and pressures to expand national forest timber harvests led some to believe that statutory protection was necessary to preserve undeveloped areas in the national forests. (See the following section on the Wilderness Act.)

Then, in 1956, the Park Service launched Mission ’66 to increase the size of the National Park System substantially. This was seen as a threat to the national forests, since many parks had been created from national forest lands. Furthermore, President Dwight D. Eisenhower supported Mission ’66, but the Forest Service was unable to obtain financial support for its countermeasure, Operation Outdoors.

Taken together, these events and conditions led the Forest Service to believe in the need for legislative blessing of their existing management direction. The multiple-use legislation proposed by the Forest Service won only lukewarm support. Few outside the agency believed it was necessary, although several conservation groups endorsed it.

Figure 3-3-Forest Service Timber Sale Program



SOURCE: U.S. Department of Agriculture, Forest Service, *Report of the Forest Service* (Washington, DC: U.S. Government Printing Office, annual series).

However, opposition was also muted. The timber industry initially opposed new legislation, believing the Forest Service Organic Act gave timber production more prominence than the multiple-use bill. The industry offered a substitute directing stronger financial considerations in national forest management. Other potential opponents, such as the Sierra Club and The Wilderness Society, generally stayed clear of the debate, focusing their attentions on statutory wilderness protection. Thus, after a relatively brief and mild struggle, the Forest Service was rewarded with the Multiple-Use Sustained-Yield Act of 1%0 (MUSYA), stating that:

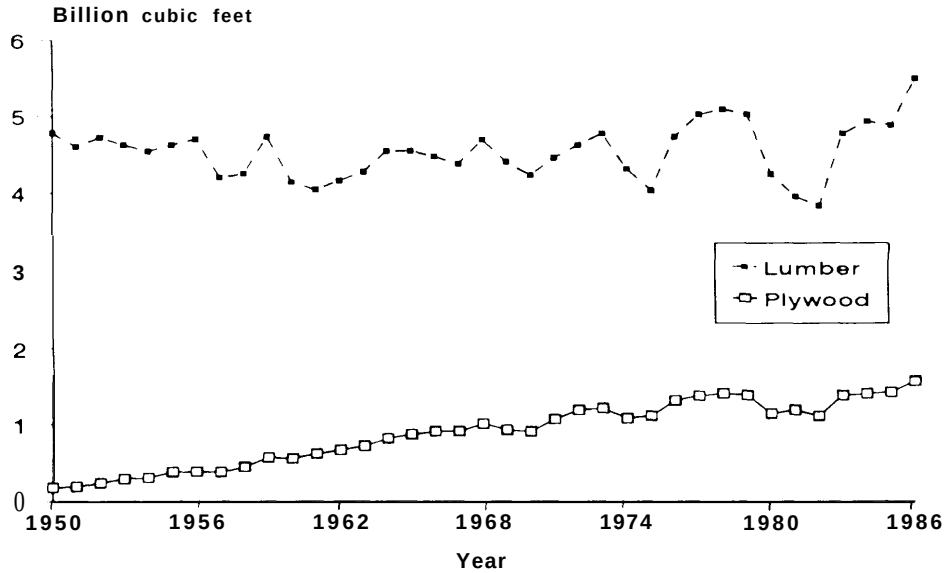
> . . . the national forests are established and shall be administered for outdoor recreation, range, timber, watershed, and wildlife and fish purposes. The purposes of this Act are declared to be supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the Act of June 4, 1897 . . .
>
> . . . The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

In enacting MUSYA, Congress essentially sanctioned Forest Service management to provide a broad array of natural resource uses and outputs, while protecting the land and resource base of those uses and outputs. Congress accepted the agency's legislative proposal, because the proposal did not change national forest management direction or congressional oversight or authority. MUSYA expanded upon the national forest purposes set forth in the Organic Act and together they provide broad direction and substantial agency discretion for managing the National Forest System.

The Wilderness Act

The Forest Service had long recognized the value of keeping some lands undeveloped. In 1924, under its general administrative authority, the agency set aside the Gila Wilderness in New Mexico, and subsequently established a system of wilderness, wild, and primitive areas. However, some observers were concerned about the administrative authority to modify area boundaries and about increasing pressures to expand national forest timber harvests, and proposed statutory protection for specific undeveloped lands in the national forests.

Figure 3-4—U.S. Lumber and Plywood Production



SOURCE: U.S. Department of Agriculture, Forest Service, An *Analysis of the Timber Situation in the United* States: *1989-2040, Part 1: The Current Resource and Use Situation.* **draft [by Haynes, R.W.] (Washington, DC: U.S. Government Printing Office, 1989), p. A-67.**

Events in the Boundary Waters Canoe Area of northern Minnesota illustrate the concerns. After World War H, the Forest Service proposed several large, long-term timber sales in the area, over long-standing local opposition. This led local conservationists —and eventually Senator Hubert Humphrey of Minnesota-to believe that timber from all national forest lands would be harvested, except where harvesting was prohibited by law (329). Comparable situations elsewhere led conservation groups, which had supported the Forest Service against the ranchers and loggers, to support the idea of statutory wilderness protection.

The Forest Service included a provision in the Multiple-Use Sustained-Yield Act of 1960, noting that ''the establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act. However, wilderness proponents were still not satisfied, and the Wilderness Act creating the National Wilderness Preservation System was enacted in 1964.

The Wilderness Act provides more explicit guidance for managing the designated areas than the Organic Act and MUSYA do for the other National Forest System lands. The Wilderness Act generally prohibits commercial activities and road and facility construction in the designated areas. Compatible commercial activities (e.g., outfitter services) were exempted, and grazing and other nonconforming uses (especially motorized access) were generally allowed to continue, if those uses had been established before the area was designated as wilderness. Furthermore, valid existing mineral rights were protected, and the act permitted new rights to be established for about 20 years (specifically, until Dec. 31, 1983). In essence, the Wilderness Act prohibited timber harvesting, new recreation facilities, and new motorized access in the areas designated as wilderness by Congress.

The Forest and Rangeland Renewable Resources Planning Act **of** 1974

RPA was enacted because of concerns about short-sighted, political decisions for the Nation's renewable resources. At that time, public trust in government was deteriorating-the Watergate scandal was breaking and Vietnam War protests were

expanding. Congress was reasserting control over the Executive Branch—for example, the Congressional Budget and Impoundment Control Act (which preceded RPA by a month) reestablished congressional control of the budget, following impoundments (nonspending of appropriations) by the Nixon Administration. Senator Hubert Humphrey, the principal sponsor of RPA, asserted that the administration's short-term spending priorities were short-changing renewable resource management.

RPA established an open, strategic planning process by which the Forest Service would address the long-range renewable resource situation in four documents. First, an Assessment produced every 10 years would examine resource conditions, trends in supply and demand, and opportunities to invest in resource production. Then, every 5 years, a program would establish the direction for all Forest Service activities, to respond to the trends and opportunities identified in the Assessment. The Program was to be consistent with the principles set forth in MUSYA and in the National Environmental Policy Act of 1969 (NEPA). Thus, Forest Service activities under the RPA Program are to provide for multiple uses and sustained yields, and the Forest Service is to include users and other interested parties in setting national direction for Forest Service activities. A Presidential Statement of Policy, which accompanies each Program, would then be used to guide the annual budget requests. Finally, an Annual Report would assess Forest Service accomplishments and progress in implementing the program.

RPA also required the Forest Service to prepare "land and resource management plans for units of the National Forest System. These plans were to be coordinated with other Federal, State, and local planning processes, and were to be developed using ''a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences. ' The plans were considered part of the RPA Program, and thus were to be consistent with MUSYA and NEPA. Thus, RPA confirmed MUSYA as the management principle for the national forests, and essentially established the requirement for public participation in national forest planning.

The National Forest Management Act of 1976

NFMA was enacted primarily in response to several lawsuits. The initial suit[5] successfully argued that clearcutting in the Monongahela National Forest violated the Forest Service timber sale authority in the 1897 Organic Act. The lower court decision was upheld by the 4th Circuit Court of Appeals in August 1975. Then, in December, the Federal District Court of Alaska extended this decision to the long-term timber sale contracts in Alaska.[6] In July 1976, a preliminary injunction followed the same logic to halt clearcutting in the National Forests in Texas.[7] Several other lawsuits were filed in late 1975 and in 1976 to stop clearcutting in the national forests. The timber industry and the Forest Service argued that clearcutting was a sound timber management tool, and that a ban would devastate the timber economy. If all the litigation were successful, Forest Service timber sales would probably have fallen by half (261). However, in the Monongahela case, the Court of Appeals stated that it could only apply the existing law; if the law was an anachronism, it was up to Congress, not the courts, to remedy the situation.

The lawsuits challenging clearcutting were only one expression of growing public dissatisfaction with national forest management. The 1970 Belle Report (264) described problems on the Bitterroot National Forest in western Montana. The Senate Committee on Interior and Insular Affairs held extensive hearings on clearcutting around the country in 1971, and issued recommendations for Forest Service clearcutting in a committee report, commonly known as the Church Clearcutting Guidelines (265). In 1970, the Forest Service had on its own initiative begun a review of the wilderness potential of many national forest roadless areas (RARE I), but this review was halted in 1972 because of litigation charging the Forest Service had been arbitrary in selecting the areas to be reviewed (294). Forest Service management was, in essence, being challenged in many ways and places.

Bills were introduced to make a simple, technical correction to the Organic Act, making it legal to clearcut timber in the national forests. However, Congress chose to respond to the full range of public

[5] *West Virginia Division of the Izaak Walton League, Inc. v. Butz*, 367 F. Supp. 422; 522 F.2d. 945 (4th Cir. 1975).

[6] *Zieske v. Butz*, 406 F.Supp. 258.

[7] *Texas Committee* on *Natural Resources v. Butz*, *Civil* Action No. 'H-76-268-CA

concerns about national forest management, rather than just address the immediate problem. Upon introducing NFMA, Senator Hubert Humphrey of Minnesota stated that:

> Time has demonstrated that we need more than a new prescription for selling timber. We need a fundamental reform in managing all of the resources associated with forested land of the national forest system . . .
>
> To me it is not enough that we modernize the methods by which timber is sold. This bill does much more. Its basic purpose is to assure that the multiple uses are realized and their yields are sustained. This bill seeks to strengthen resource management so that it is ecologically effective (120).

Because RPA required land and resource management plans for units of the National Forest System, Congress chose to guide the local planning process by amending RPA. This option also fit with Congress' intent to retain the basic direction for the National Forest System, as set forth in the Organic Act and MUSYA. NFMA was intended to assure balanced use and protection of all the resources, today and tomorrow. As noted in the Senate Committee Report:

> The role of the Forest Service in the management of the National Forest System is to act as a steward of the land . . .
>
> Timber production and sale are important aspects of the overall management of the National Forest System lands, However, they are not the sole objectives of management planning . . .
>
> The other resources of the forests, wildlife and fish habitats, water, air, esthetics, wilderness must be protected and improved. Consideration of these resources is an integral part of the planning process. . .
>
> It is, therefore, time for Congress to act in order to insure that the resources found in our National Forests can be used and enjoyed by the American public, now and in the future (261).

Senator Humphrey described the relationship among NFMA, RPA, and MUSYA by noting that "The Forest and Rangeland Renewable Resources Planning Act and these amendments are intended to be fully compatible with the principles of the Multiple-Use Sustained-Yield Act, and, in fact, to provide further direction in the implementation of that act" (120).

Much of NFMA is an amendment to the land and resource planning requirement of RPA. Some amendments provide considerations for management. For example, section 6(k) specifies consideration of physical, economic, and other pertinent factors in determining the suitability of land for timber production. NFMA also establishes standards and guidelines for planning. For example, section 6(f)(2) requires the plan to reflect proposed and possible actions, including the planned timber sale program, and section 6(g)(2)(A) directs the Forest Service to identify lands suitable for resource management. Section 6(g)(3) directs guidelines to achieve the goals of the RPA Program, while subsection (A) specifies the consideration of the economic and environmental aspects of resource management systems, and subsection (F)(ii) requires an assessment of potential environmental, biological, esthetic, engineering, and economic impacts of each timber sale. In addition, section 6(1) requires estimates of long-term benefits and costs and a representative sample of government returns and expenditures associated with the sale of timber.

NFMA also establishes standards and guidelines for assuring protection of the resources of the national forests. Examples include providing for a diversity of plant and animal communities (section 6(g)(3)(B)); prohibiting irreversible soil, slope, and watershed damage (section 6(g)(3)(E)(i)); assuring adequate reforestation within 5 years (section 6(g)(a)); protecting waters, wetlands, and riparian areas (section 6(g)(3) (E)(iii)); limiting the size of clearcuts (section 6(g)(3) (F)(iv)); revegetating roads unless the need for a permanent road is specified in a road plan (section IO(b)); and generally limiting timber sales to a quantity that can be harvested annually in perpetuity on a sustained-yield basis (section 13(a)). Thus, NFMA requires many considerations, standards, and guidelines in planning for the management of the national forests under MUSYA.

While the Organic Act and MUSYA define the parameters of management, and NFMA details considerations, standards, and guidelines, NFMA is not a set of prescriptions for national forest management. RPA and NFMA establish a planning process that leaves substantial management discretion with the agency. Furthermore, NFMA clearly intended that management, as set forth in the forest plans, respond to the desires and concerns of the people, as expressed locally and through the national strategic planning process under RPA. NFMA explicitly requires "public participation in the development,

review, and revision of land management plans . . .' RPA and NFMA planning are also to be conducted in accordance with NEPA, and NEPA also requires that Federal agencies consider public input in decisionmaking.

In sum, NFMA emerged in response to lawsuits that would have substantially reduced Forest Service timber sales. However, Congress chose to provide guidance for the required forest management plans, rather than enact only management prescriptions or a technical correction to the timber sale authority. The guidance is mostly in the form of planning considerations and standards and guidelines for analyzing, reporting, and protecting the quality of resources and the environment. NFMA was also intended to assist in producing the high-level of sustainable outputs required under MUSYA. NFMA leaves the Forest Service with substantial Forest Service discretion in managing the national forests, but requires the agency to consider public interests and concerns, and directs that the forest plans be prepared in accordance with NEPA. Thus, the Organic Act and MUSYA provide a framework for managing the national forests, while NFMA and NEPA essentially direct that local resource conditions and public desires and concerns be considered in determining the details,

Philosophical Basis for Government Ownership

There are two, interrelated reasons for government ownership and management of forests and rangelands and of renewable resources: 1) the production of one resource output can affect other resources, and 2) many resource uses are not currently marketed. Forests and rangelands clearly produce more than just one output or value; a forest, for example, can simultaneously grow timber, provide food and cover for wildlife and livestock, and yield water for human use, land animals, and fish. Activities to modify one aspect of the forest will affect other uses and values. For example, thinning a timber stand to increase timber growth might also increase water yields and forage production, but might decrease wildlife cover and water quality. This interrelationship among outputs is generally known as joint production.

Joint production can be a problem for natural resource management, because many resource values are not marketed. (See box 3-B.) Timber is the only national forest output priced in a competitive market,[8] and even for timber, the Forest Serv ice does not respond to market signals in traditional ways (increasing sales when prices and/or profits rise, and decreasing sales when prices and/or profits fall). For other national forest resources, markets are not used to set prices or to signal appropriate operations and investments.

While markets can improve production efficiency, efficiency was explicitly rejected as the guiding principle for managing the national forests. In debating MUSYA, the House Committee on Agriculture did not even consider a timber industry proposal to base management direction on financial considerations (329); instead, MUSYA directed that management need not be ''the combination of uses that will give the greatest dollar return or the greatest unit output. ' Implicitly, Congress recognized the limitations of markets in providing a balanced mix of resource values, and accepted the Forest Service bill making multiple use and sustained yield the appropriate directions for national forest management.

Congress maintained this philosophy in enacting NFMA. As a result of the Belle Report (264) and other evidence of uneconomical timber investments, the Senate included a financial standard (production costs less than economic returns) for lands with timber production as a management goal. A similar provision was considered and rejected by the House Committee on Agriculture and on the floor of the House. The substitute, agreed upon by the conference committee and accepted by both Houses, requires consideration of economic (and other) factors in determining lands not suited for timber production, and then allows timber salvage sales and sales to protect multiple-use values on lands not suited for timber production. Section 6(l)(1) of NFMA also requires the Forest Service:

> . . . to provide information on a representative sample basis of estimated expenditures associated with reforestation, timber stand improvement, and sale of timber from the National Forest System, and shall provide a comparison of these expenditures to

[8]Not all national forest timber is sold in competitive markets. From 1973 to 1979, 25 percent of timber sales (including more than half of all sales in the central and southern Rocky Mountains) received only one bid (288). (Such data are not published regularly, and more recent data are not available.) In areas where one-bid sales are common, Forest Service timber sale appraisals, rather than competition, determine timber prices.

the return to the Government resulting from the sale of timber . . .

However, NFMA does not proscribe agency actions or require responses based on the comparison of costs and revenues.

What Is Multiple Use?

MUSYA defines multiple use as:

> .. the management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all of these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

This definition of multiple use is not very useful for determining the proper management of the national forests. The only goal is to meet the needs of the people, while the only limitation is to protect the productivity of the land. In addition, multiple-use management is to consider relative resource values, but maximizing returns or outputs is not to be the sole basis for determining management. (This last provision was apparently a response to the timber industry's proposal for the multiple-use bill to emphasize financial considerations in Forest Service management decisions.)

Joint Production or a Dominant-Use Patchwork?

The concept of multiple use encompasses two distinct views about managing to produce outputs and uses: joint production and patchwork of dominant uses. As noted above, joint production recognizes that forests and rangelands are ecosystems that can produce more than just one use or output of value-they provide wildlife habitat, yield water, can be used for recreation, and produce timber and forage for livestock.[9] Management of one use or value will affect the others; for example, a clearcut yields timber, generally increases water flows, augments forage for livestock and wildlife, and provides access to new areas for some types of recreation, but may also degrade water quality and eliminate wildlife cover and certain recreation opportunities, at least temporarily.

While joint production is clearly an accurate view of the ecological interactions on forests and rangelands, it is difficult to apply the concept to land management. Despite the long-standing recognition of joint production, our understanding of the relationships among resource values is incomplete. The biological and social sciences have, to date, provided only a fragmentary picture of the ecological interactions for a given site. Furthermore, seemingly minor variations in activities or locations can cause substantially different interactions among resources depending on soil types, the nature and condition of surrounding sites, and other factors. Finally, no objective way exists to determine whether the net result of management actions on all of the current and future uses and outputs is desirable. Economics (usually benefit-cost analysis) is often used to evaluate the results, but the limits of economic analysis combined with the limits of our knowledge of biological and social interactions make such an evaluation incomplete, at best. (See ch. 8.)

Another view of multiple-use management, a patchwork of dominant uses, provides clearer direction for land managers. Under this approach, lands are divided into management units, and each unit is managed to produce more (or higher quality) of the dominant use(s) or output(s) while maintaining environmental and resource quality standards. Despite the visceral reaction of many to the concept of dominant-use management, this approach to achieving multiple use is clearly consistent with MUSYA. The phrases "judicious use of the land for some or all of these resources' and ''some land will be used for less than all of the resources" suggest that the Forest Service (which drafted the definition) believed that multiple use could be achieved by separating conflicts in space. Furthermore, some uses must be separated, because they are incom-

[9] It should be noted that, in different situations, multiple use may mean something other than the broad variety of uses and outputs commonly associated with forests and rangelands. In the mineral industries, for example, multiple use means allowing more than one type of mineral extraction from a site, with no reference to other uses, Thus, in certain circles, oil drilling on a hardrock mining claim is multiple use, even if no other uses occur (329).

Box 3-B—Privatization of Federal Lands

Since the late 1970s, some have questioned the validity of the historic justification for Federal land and resource ownership. Classical economics, dating back to a century before Adam Smith, asserts that governments should minimize their interference with private land allocation and production decisions, because government interference necessarily reduces optimal output **(21** 1). Citing this theoretical **base, "sagebrush** rebels" and others have argued for privatization--the disposal of the national forests (and other Federal lands) by selling or transferring the land to individuals and organizations in the private sector (45, 180). This approach would end or at least limit Federal land ownership, and rely principally on private market responses to consumer demands for determining resource use and protection. A less draconian form of market responsiveness, called marketization, would retain Federal ownership, but seek to reap the benefits of private markets by rewarding Forest Service managers for responding to consumer demands (187). This would require establishing markets for many uses and outputs that are not currently marketed or that are subsidized.

Benefits of Market-Based Decisions

Markets have two principal strengths for guiding land and resource management decisions. First, markets **provide** unmistakable signals of individual consumer demands. Market prices of goods and services fluctuate to balance supply and demand by allocating available supplies among consumers. High prices reflect strong demand, while low prices show weak demand. Similarly, price changes show changing demands, with prices rising when demand is increasing (or supply is falling) and prices falling when demand is decreasing (or supply is rising).

The second strength of markets results from the clarity of the signals about supplies and demands: markets lead to efficient production among the marketed resources. Prices and production costs determine the most profitable operations and investments. Assuming that managers respond to profits, actions will be shifted to producing the most profitable goods and services-those with high prices (strong demand) relative to the cost of production. These shifts to greater production of the most profitable resources will increase supplies and thus eventually reduce prices. Ultimately, managers responding to the price and profit information will achieve the most profitable balance among all the marketed resources.

Limitations of Market-Based Decisions

The primary limitation to using markets for land and resource management decisions is that many uses and values are not marketed. Sometimes, pricing decisions have intentionally been made outside markets. For example, as a society, the American people have generally chosen **not** to charge a market price for the right to fish or hunt. Similarly, the established fee for grazing livestock on Federal lands is substantially below the calculated fair market

patible; few people want to picnic or camp in a recent clearcut, for example. Thus, a dominant-use patchwork is, in some cases, necessary.

Applying a dominant-use patchwork for managing the national forests is not without difficulties. Our incomplete knowledge of ecological and social interactions also restricts multiple-use management under this view, although less detailed understanding is needed for setting environmental and resource quality standards and for monitoring results to assure that standards are met. However, determining standards is not a technical process. It is a social process, with the affected and interested individuals and groups defining the minimum acceptable standards. Defining the patches--which lands are managed for which uses—is also not a purely technical process. Most lands can be managed for various uses, emphasizing timber production, water production, wildlife production, etc. Furthermore, some lands that are highly effective at producing one value (e.g., timber) might also be highly effective at producing another (e.g., wildlife), and joint management of the values might produce more of both than would be produced in a dominant-use patchwork. The ability of sites to produce conflicting values—e.g., wood and undisturbed ecosystems—is the heart of the controversy over preserving old-growth Douglas-fir forests in western Washington and Oregon. Thus, although technical production is an important consideration in determining g the dominant use for a patch of forest or rangeland, the demands and desires of the affected and interested individuals and groups must also be considered.

In reality, multiple-use management is more complicated than either joint production or a dominant-use patchwork suggests, and 'multiple-use manage-

value of grazing(181, 281). Often, uses are subsidized to ensure availability to all, particularly for recreation. Market proponents argue that subsidies will lead to overuse, and that price can be used to efficiently allocate the supplies among potential consumers. However, price uses wealth and income for allocating use, while other allocation mechanisms, such as lotteries and first-come-first-sewed, may be more equitable (61). Thus, for some resource uses, society (through its elected representatives) has chosen subsidies and alternative allocation schemes.

High transaction costs limit the effectiveness of some resource markets (31). For some resources, the cost to enforce market transactions is quite high; for example, the current easy access to national forests makes it difficult to ensure payment of the fair market value for dispersed recreation. Furthermore, the numerous highways and inholdings bring in many visitors whose primary purpose is not visiting the national forest. A similar difficulty is being able to relate increased outputs to management activities. For example, increased water flow may result from managerial efforts, but it also may simply result from additional precipitation; such uncertainty (together with existing water rights law) may make it difficult for the Forest Service to charge for the increased water flow. Thus, difficulties in collecting market prices for the resource outputs produced may limit the use of markets for guiding management of the national forests.

In addition, the collective-goods nature of some resources may prevent the creation of markets (31). Collective goods are provided for everybody, if they are provided at all, because people cannot be excluded from receiving the benefits. Such benefits usually result not from the use of the goods or services, but simply from their existence; thus, collective goods are also called nonuse values and it is impossible to establish markets for them. For example, endangered species are collective goods, because much of their value is derived from knowing they exist, rather than from using them. This is not to say that everybody wants the collective good; some people undoubtedly get little personal benefit from knowing spotted owls exist. However, markets work because each buyer can choose the amount of the specific goods or services bought, whereas the collective nature of nonuse values prevents each American from choosing the amount of the collective good bought. Moreover the benefits of collection goods (existence) cannot be withheld from those who don't pay.

Externalities are a third limitation to using markets for land and resource management decisions. Markets involve transactions between buyers and sellers, but occasionally transactions harm people who are not involved in the transaction. For example, when a landowner sells timber, the buyer and the seller are involved in the transaction, but others--recreationists, sightseers, downstream water users, etc.—may be affected by the timber sale. If all resource uses and outputs were sold in equally efficient markets, the externalities would be resolved within the marketplace. However, the high transactions costs for some resources and the collective-goods nature of other resources prevent establishing equally efficient markets for all resources. Therefore, externalities would plague purely market-based guidance for land and resource management.

ment" has come to mean either approach or a combination of the two. Early Forest 'Service management apparently focused on the dominant-use patchwork approach—use levels were relatively low, and conflicts were managed simply by separating users. As timber harvesting and recreation use increased after World War II, managing the conflicts became increasingly important and increasingly difficult. While the Forest Service still manages some conflicts by separating users in space and time, it also attempts to accommodate other values by modifying dominant-use management. Such modifications to dominant use may reflect the joint-production nature of forest and rangeland outputs and values, but they are only assumed to approximate joint production.

In practice, joint production and dominant-use patchwork can lead to quite different management activities for a given site. The phrase, ''multiple-use management, therefore, provides little guidance for land management, and can be very misleading when used to describe management direction. As recently as 1989, Henry Vaux noted the lack of agreement on the meaning of multiple use:

> Why such an apparent conflict in meanings? Because the symbol [multiple use] has at least some validity in describing these disparate forms of forest management . . .
>
> Even in an economic context, multiple use maybe interpreted in more than one way.

Thus, ''multiple use' has multiple interpretations, meaning different things to different people. To some, multiple use necessarily includes use of commodity resources (timber, livestock forage, minerals). Areas where such uses are proscribed, such as recreation sites and wilderness areas, there-

fore are not considered multiple-use areas. However, others have noted that such areas still yield water and are used for recreation and by wildlife (99), while clearcuts effectively eliminate recreation use of the harvest site, at least temporarily. It is unclear which **uses or** how many **uses are necessary** for an **area to** be managed under multiple use.

Thus, although multiple **use assures** consideration of the various resource values and suggests **that a** balance among the values is appropriate, its multiple meanings and various interpretations, together with the technical difficulties of estimating joint production relationships, limit its usefulness for explaining or defending alternative management practices.

Confusion in the Act

One source of confusion in practicing multiple-use management is the **list** of purposes for **administering** the national forests under MUSYA—''outdoor recreation, range, timber, watershed, and wildlife and fish purposes. This list combines uses, outputs, resources, and land classes as the purposes for administering the national forests. (See table 3-l.)

This combination of purposes was not accidental. The terms were selected to assure a particular order in an alphabetical (and therefore neutral) listing (56, 329). Recreation had to come first, to combat Park Service efforts to obtain national forest lands and to show that commodity production was not the first and foremost purpose of national forest management. Then, a land classification-range-was used instead of livestock g-razing or forage, to assure that this commodity use was not listed frost. Timber was selected to achieve centrality (and implicitly neutrality), although forestry has been (and sometimes still is) used to describe timber production (53), and wood products are the end use; however, forestry or wood products would have meant listing this purpose first (emphasizing it) or last (denigrating it), neither of which was desired. Watershed was chosen, both to include soil resources implicitly and because other Federal agencies (e.g., the Bureau of Reclamation and the Army Corps of Engineers) are responsible for providing water. Finally, wildlife and fish-rather than the more natural phrase, fish and wildlife, or the more comprehensive term, animals-was used to assure last place in the listing, because States have primary jurisdiction over animal management and because the U.S. Fish and Wildlife Service shares Federal responsibility for animal management. Thus, although the listing of purposes used in MUSYA was a hodgepodge of uses, outputs, resources, and lands, it was politically expedient.

The odd mixture of uses, outputs, resources, and land classes in MUSYA has contributed to the confusion over what multiple-use management is. Multiple use suggests an emphasis on uses, or perhaps on outputs. However, the definition focuses on managing resources and protecting the productivity of the land, and specifically prohibits selecting the combination of uses that would maximize returns or outputs. A focus on managing resources suggests a more integrated, ecological approach to management than would result from a focus on producing uses and outputs (17). MUSYA does not clearly define the proper focus for Forest Service efforts, and the resulting management thus mixes resource protection with use and output production without defining the balance among resource values.

Table 3-l—Uses, Outputs, and Resources Corresponding to the Purposes Listed in the Multiple-Use Sustained-Yield Act of 1960 (MUSYA)

Purpose in MUSYA	Human use	Resource output	Resource base
Outdoor recreation , ...	Leisure activities	None	Facilities, access, and acceptable land
Range	Animal products	Forage	Forage-producing plants and grazable land
Timber.	Wood products	Timber	Trees and harvestable land
Watershed	Water, hydro power	Water	Precipitation, soil, and protective vegetation
Wildlife and fish	Hunting, fishing, birdwatching, etc. (i.e., recreation)	Animals	Animals and their habitat requirements (food, cover, etc.)

SOURCE: Office of Technology Assessment, 1991.

What Is Sustained Yield?

MUSYA defines sustained yield as:

> . . . the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the national forests without impairment of the productivity of the land.

This definition is much more useful than the definition of multiple use for determining national forest management. Goals are defined more clearly: the productivity of the land is to be maintained, while producing a high level of annual (or periodic) outputs forever. As with a trust fund (see box 3-C), this implies producing a high annuity while protecting and enhancing the fired's assets. This definition is also consistent with the original management direction for the national forests enacted in the 1897 Organic Act-that the lands are protected, that water flows are secure, and that timber supplies are continuous.

Historically, sustained yield has been applied mostly to timber. Providing a sustained timber supply was a European forestry tradition imported to America at the turn of the century (188). In particular, Gifford Pinchot wanted to show that timberlands could be managed profitably for continuous production, demonstrating that the cut-and-run practices of the timber industry were unnecessary (188, 327). Congress has, at various times, given direction to provide continuous timber supplies-in the 1897 Organic Act for the forest reserves, in the 1937 0 & C Act[10] for managing certain Federal timberlands in western Oregon, and in the 1944 Sustained Yield Act[11] authorizing special units of Federal timberland to be managed to provide timber for specific local communities.

Sustained yield has also been applied to managing rangelands and fisheries. The Wilderness Act implies sustainability for natural processes in describing wilderness as "an enduring resource" and in prohibiting most developments. Nonetheless, MUSYA appears to be the first time that sustained yield was broadly applied to all renewable resource values, and this was probably done in part to counter Park Service efforts to become the premier Federal recreation agency. Regardless of why it was proposed, the concept of sustained yield of all resources may have been the most persuasive reason for congressional support for MUSYA (56).

There are three limitations to implementing sustained-yield management in the national forests: 1) the physical/biological bias of the approach, 2) the limits of knowledge, and 3) the resource focus. First, sustained yields are determined by the physical and biological productivity of the sites, with little or no regard for the relative value of those yields. Essentially, this view assumes that producing more must be better, regardless of the costs and the impacts on other values. Bowes and Krutilla(31) noted that the Forest Service has an ''institutional focus on the stability of harvest levels and on biological criteria for timber treatments . . ." NFMA perpetuates this view in section 6(m) by identifying the "culmination of mean annual increment'—the age of maximum average physical production-as the standard for harvesting timber. Thus, sustained yield focuses on perpetuating supplies by restricting uses and outputs to growth or carrying capacity.

Furthermore, as discussed above, the biological and social sciences have provided an incomplete picture of the relationship between outputs (yields) and the resource base. Current resource outputs can be used to estimate productivity, but current productivity is an imperfect predictor of permanently sustainable production levels. For example, current timber growth rates can be estimated and used to determine appropriate harvest levels, but timber harvests probably alter growth rates by changing hydrologic patterns and soil nutrients and microfauna. Furthermore, using one resource affects the current and future productivity of other resources. Timber harvests, for example, can alter (increasing or decreasing) both short-term and long-term water yields, forage production, and animal populations. The limits of knowledge about ecological and social relationships make it difficult, if not impossible, to guarantee the sustained yield of all the resources at this time.

Finally, the supply and production emphasis necessarily focuses on the uses and outputs of individual resources (17). This focus has two effects. First, it inhibits ecosystem management. Managers tend to focus on producing and protecting individual

[10] O & c Act of 1937, Act of Aug. 28, 1937, ch. 876 (50 Stat. 874; 43 U. S.C.1 181a).

[11] Sustained Yield Forest Management Act, Act of Mar. 29, 1944, ch. 146 (58 stat. 132; 16 U.S.C 583).

Box 3-C-The National Forest System as a Natural Resource Trust Fund

The National Forest System was established to provide continuous and permanent natural resource benefits. In the Forest Reserve Act of 1891 and the Organic Act of 1897, Congress authorized reserving lands from the large-scale clearcutting that allegedly caused downstream flooding and destructive wildfires. The term reserve has a double meaning. In addition to meaning something saved for future use or special purpose, a reserve is also ‘‘capital held back from investment by a bank or company in order to meet probable or possible demands. Thus, reserve can also suggest capital assets held to provide for future needs. It is possible that Congress chose the term reserve to convey both meanings: saving the land from timber cutting to preserve water quality and establishing the capital needed to provide for future demands.

Regardless of congressional intent in choosing the term reserve, the National Forest System is, in some ways, comparable to a trust fund. The Organic Act established continuous timber supplies as one of the purposes for forest reserves. The Multiple-Use Sustained-Yield Act of 1960 requires the Forest Service to maintain the productivity of the land Such direction indicates Congress' desire that the productivity of the national forests be protected, much as the assets of a trust fired are maintained

The eastern national forests complicate the view of national forests as a trust fund. In contrast to the western national forests, with their substantial reserves of timber and expanses of lands, the eastern national forests **were** acquired largely from cut-over lands, without enormous capital assets to be reserved Subsequent management of these lands has enhanced the **asset** value of the eastern national forests, and illustrates the possibilities for management to improve the asset base. Thus, the history of the eastern national forests can also be seen as a Forest Service success in natural resource trust management.

Managing a trust fund illustrates the dilemma posed for managing the national forests. A trust fund is to generate annuities for the beneficiaries, but the assets must be protected and enhanced, to assure future annuities. Similarly, the national forests are to provide for today’s uses and outputs, but the productive base (the lands, resources, and ecosystems) must be managed to assure that the uses and outputs can be sustained in the future. In both cases, managers are responsible for maintaining and enhancing the assets. Annual benefits are important, but preserving the productive assets is paramount.

In both the National Forest System and trust funds, moreover, professional managers are responsible for protecting the assets and producing the annuities and must also be responsive to the needs of the beneficiaries. At times, the beneficiaries may choose to forgo some annuities, to increase future annuities or for some moral or ethical reason. For example, a trust fired’s beneficiaries may instruct the fund’s managers to terminate certain investments, even though the managers may believe them to be desirable assets. Thus, while the managers are responsible professionals, the beneficiaries may prefer a mix of assets and annuities that is less than optimal, as defined by the professional.

The “annuities” of the National Forest System include not only uses and outputs, some of which are difficult to quantify (see box 8-A, p. 145), but also some nonuse values. Many people, for example, cherish various aspects of relatively undisturbed ecosystems. Furthermore, different balances of uses, outputs, and nonuse values yield different distributions of benefits. For example, building and/or maintaining campgrounds provides little direct benefit to the timber industry (although the workers may use the campgrounds) or to backpackers; wilderness may benefit backpackers, but provides little value for loggers or for snowmobiles. In contrast to a traditional trust fund, with its financial annuities, no simple, technical measure exists to determine the optimum level and mix of values provided from forests and rangelands.

Finally, the Forest Service is required by law, to provide the public with opportunities to participate in the national forest planning process. Thus, the public both benefits from and influences the management of the National Forest System. This contrasts with traditional trust funds, where the beneficiaries are relatively isolated from trust management. Nonetheless, trustees are to be prudent managers of the assets, and for a government agency with assets and annuities that are difficult to quantify, prudence dictates that the beneficiaries be directly involved in deciding about the annuities to be provided and the assets to be maintained and improved.

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[1] *The American Heritage Dictionary of the English Language* (Boston, MA: American Heritage Publishing Co. & Houghton Mifflin Co., 1969), p. 1106.

resources, rather than on integrating the protection and use of ecosystems. Under this focus, multiple use will more likely be a dominant-use patchwork, rather than joint production, with coordinated management of individual resources rather than truly integrated resource management.

When MUSYA was enacted, protection was considered necessary only to ensure that uses and outputs could be sustained. However, people today also value naturalness, and many wish to see natural ecosystems protected. The recognition of such nonuse values is at least part of the controversy over national forest management in the Pacific Northwest and elsewhere.

NATIONAL FOREST PLANNING: ACHIEVING THE GOALS

Planning Direction and Framework

What, then, are the goals for managing the national forests and how can they be achieved? The Organic Act and MUSYA frame the goals effectively. National forest management is to accommodate uses, produce outputs, and sustain ecosystems, with uses and outputs constrained to sustainable levels. Furthermore, as stated in MUSYA, management is to provide "the combination that will best meet the needs of the American people . . .' Thus, the proper mix of values is, essentially, determined by the 1) the physical and biological capabilities of the lands, and 2) the economic, social, and personal interests of affected and concerned individuals and groups.

Planning for the management of the national forests is the means of achieving those goals. Planning is done whenever activities are proposed. The first Forest Service "plans" were simple land allocation decisions to separate conflicting uses. More formal planning began after World War I, and expanded following World War II, especially to organize and coordinate the expanding timber program. By about 1960, the Forest Service recognized the need for integrated planning to coordinate the multiple uses of the various resources. However, planning efforts were still primarily internal, technical approaches to resolving problems and determining direction.

The first legal requirement for national forest planning was enacted in RPA. The principal purpose of RPA was to establish a national strategic planning process for America's renewable resources (259). RPA also directed the Forest Service to prepare integrated land and resource management plans for units of the National Forest System. Because these plans were deemed part of the RPA program, they were to be developed in accordance with MUSYA and NEPA.

NFMA substantially amended the RPA direction for forest planning by adding numerous considerations and requirements to be met in the planning process. However, NFMA provided no additional guidance on how to determine the mix of resource uses, outputs, and protection.

Strategic Planning for the National Forests

Taken together, the Organic Act, MUSYA, NEPA, RPA, and NFMA provide the framework for managing the national forests. The Organic Act and MUSYA established the foundation-that the Forest Service is to accommodate uses and produce outputs while sustaining the ecosystems upon which the uses and outputs are based—but they did not identify the mix or balance of uses, outputs, and protection. Instead, MUSYA implicitly acknowledged that the proper mix is determined by people's needs, as expressed through public participation and through legal requirements, and that the mix can change over time. NEPA provided a framework for disclosing intended actions and the possible consequences of those actions to the public. RPA required integrated land and resource management plans, and NFMA then established several management considerations and requirements, and specified public involvement in developing, amending, and revising management plans.

These laws implicitly direct strategic planning for the national forests. Forest planning is an open process to set goals for the conditions of and outputs from the national forests, to identify standards and guidelines for activities, and to describe the actions and funding needed to achieve the goals. The public is to participate in setting technically and politically feasible condition and output goals for Forest Service managers. However, forest plans must also be consistent with the strategic direction set in RPA planning.

Setting Direction

Strategic planning is a process for establishing management direction for an organization. In business, it defines the concept of the firm, and reflects the social, economic, and political setting within which it operates. For a Federal agency, strategic planning begins with a clear statement of the agency's mission, defining what service the agency provides and who the clients/beneficiaries are. The Forest Service's current motto-Caring for the Land and Serving People—is an overgeneralized direction to accommodate uses and produce outputs while protecting lands and sustaining ecosystems.

The most widespread problem in strategic planning is vague goals (101). Goals must be specific enough to provide real direction for managers and concrete enough to measure success. A broad, imprecise goal, such as "optimize the balance of resource values,' is subject to widely different interpretations. It gives managers no objective basis for evaluating the impacts and tradeoffs of their various options; different managers could conceivably undertake diametrically opposed actions under such general, unspecific guidance. The concrete goals in a forest plan would identify the quality, quantity, cost, and time of the uses, outputs, and conditions that are feasible and desirable, establishing a clear direction for managing the resources and ecosystems of the national forest and specific measures to evaluate performance.

Forest plans generally have not provided such a description of forest management goals. The size and complexity of a national forest may make it virtually impossible to provide a comprehensive, detailed description of the quality, quantity, cost and timing of all uses, outputs, and conditions. Rather, a manageable set of goals could be established by focusing on key issues and concerns, explaining how management will affect pivotal sites, produce important outputs, and protect critical lands, resources, and ecosystems. Furthermore, the forest plan could describe how management is likely to be different from what was occurring before the plan was adopted. The Forest Service has recognized this point, and the 1981 Advanced Notice of Proposed Rulemaking (287) proposes incremental (rather than zero-based) revisions for forest planning. Nonetheless, by focusing on issues as well as on management changes, strategic forest plans can both guide the agency and inform the public.

The Irrationality of Strategic Planning

Strategic planning is messy and imprecise, rather than rational and scientific (241). It necessarily involves considering many feasible directions and selecting the one that best fits the organization's character and clientele. No precise, rational, scientific systems exist for making the selection, no calculus of inputs and outputs can determine the right choice. Rather, strategic planning means selecting the mission that will work best for a particular organization, with its current mix of employees and customers; for a different organization or at a different time, a different option might be preferable. Furthermore, because the public is both the "owner" of government assets and the client of agency programs, a government agency must consider public and political needs and desires in strategic planning.

The imprecision of strategic planning contrasts with early expectations about NFMA planning. Many, inside and outside the agency, believed that NFMA planning "would essentially be a scientific process" (276)-that enough facts and the right computer model would lead to the "right' answers for how to manage the national forests. The Forest Service has recognized the limitations of a rational, scientific process for forest planning in its recent internal critique of NFMA planning (276). However, even from the outset, some observers have noted that national forest planning was inherently political, and that a technical, scientific process could not lead to acceptable plans (3, 49, 79). Despite these early warnings, the Forest Service is only now acknowledging that forest planning is dominated by public concerns and interests.

In forest planning, some form of public agreement—working consensus, informed consent, etc.—is necessary, if the plans are to be implemented. At times, consensus and the middle-ground are not feasible, and the Forest Service must make a decision that necessarily favors one group or another. Regardless, the decisions and the rationale for those decisions must be explained in plain, nontechnical English. Decisions are also more likely to be accepted, if the public and the line managers have been involved in the process, understand the limits of the resources, and see that consensus cannot be reached. One common objection to forest planning is that the public doesn't understand how and why decisions were made (277).

To participate fully and constructively, people need to know what will be decided in the plan, what decisions will be postponed, and where and when those decisions will be made (277). Public involvement in strategic forest planning is necessarily an ongoing process, throughout the preparation and implementation of the plans. The planning regulations should specify how plan decisions are to be treated during implementation, and under what conditions plans are to be amended.

Furthermore, the discussions among the Forest Service and the public should focus on the important issues and desires. Needs and desires may be expressed as concern over particular sites, interest in achieving certain output levels, or desire to have areas or resources protected or preserved. The Forest Service has recently noted that plans are more successful if the full range of needs is considered—emotional and symbolic needs, as well as economic and community needs and organizational needs (276). Regardless of how they are expressed the public's needs, desires, concerns, issues, and interests must all be addressed in every step of preparing and implementing strategic forest plans.

The Information Base

Planning for a desired future requires some understanding of the present, including the peculiarities of an organization-its structure, its personnel, its customers, and its owners or board of directors, Strategic forest planning would take stock of the national forest lands and resources, the Forest Service workforce, the interested publics, and the American people and Congress.

Inadequate information is a common problem in strategic planning (101). Complete data will not ''solve' forest planning problems, because strategic planning is not scientific, with data and computers to get the "right' answers. In addition, measures for some outputs and conditions will always be imprecise. Nonetheless, strategic planning depends on an analysis of the current situation-the resource conditions and trends and the public's concerns and desires. Knowing the starting point is essential to determining the actions necessary to achieve the goals. An inadequate ''situation audit' would restrict the value of the forest plan as a guide to present and future Forest Service actions, because the starting point is uncertain.

The incomplete data on ecosystem conditions, especially the lack of information on resource quality, in the RPA Assessment has been noted elsewhere (259), Data inadequacies in national forest planning are described in ch. 6 of this report. Data must not only be complete, they must also be timely. Outdated resource information in NFMA planning has been described as a serious problem (1), and Congress has provided temporary protection from judicial review to forest management decisions based on outdated information (28). Furthermore, sometimes even the issues being considered in forest planning are out of date, and no longer reflect the current concerns (1). The outdated information on resources and concerns principally results from the long timeframe required to develop the first round of forest plans, and might not be a continuing problem if the plans can be revised more expeditiously. Nonetheless, the timeliness of information, as well as its completeness and accuracy, must be addressed explicitly in the planning process.

The assessment of the current situation is a necessary precursor to examining options and opportunities in forest planning. Inventories must respond to the issues and concerns for each forest, to assure that relevant data are collected, and that time and money are not spent gathering unnecessary information. The Forest Service has not been consistently successful in identifying relevant data needs early in the planning process; for example, although the northern spotted owl was identified as an indicator species for old-growth Douglas-fir habitats in the early 1980s, the inventory of spotted owls and their habitat was not begun until 1989. In addition, although relevant data are determined by local concerns and issues, collection methods and measurements for information that is needed commonly or nationally should be standardized, to allow for aggregation of data from numerous forests.

Examining options and opportunities is a major part of the NFMA planning process. The process is often highly technical, as when land and resource capabilities are determined, tradeoffs are analyzed, and management prescriptions are developed. However, the public is affected by and interested in the results of the analyses, and the users, not technical standards, determine the compatibility or incompatibility among various uses and outputs of a given site or adjoining areas. Similarly, while the efficiency of management prescriptions can be technically evaluated, the prescriptions must be acceptable to the

public. Thus, examining options and opportunities is both a technical and a social process.

Implementation

The strategic plan guides an organization's actions. Although a strategic plan must be implemented, it is neither a long-term budget plan nor an ironclad commitment (241). This is particularly true for government agencies, since managers do not control all the variables that determine implementation (particularly budgets). Instead, the strategic plan identifies goals for the action plans used to build annual budgets and to determine activities. Forest plans should define condition and output targets for the national forests, which can then be the basis for budget proposals and for subsequent actions. They cannot be guaranteed commitments, because Congress enacts Forest Service appropriations annually. This contrasts with the view of forest plans as social ***contracts.*** Nonetheless, forest plans are agreements between the agency and the public about the goals of national forest management, and should therefore guide budgets and subsequent actions.

It is unclear whether forest plans are guiding budget proposals and management activities. Implementation difficulties arise from the complexity of environmental laws (206), but the agency believes that the plans are guiding national forest management (276). Others disagree, suggesting that the agency has backed away from implementing some forest plan decisions (205) or that the actions don't match the promises of the plans (76), Perhaps more importantly, the monitoring and evaluation of activities and results has been inadequate to determine whether forest plans are being implemented (i.e., whether budgets and actions are consistent with the plan) and whether the results match the expectations. (See ch. 6.)

A further problem in strategic planning is that line managers often do not realize that planning is a managerial function, that ' 'planning and doing are separate parts of the same job; they are not separate jobs" (101, 241). Managers who have not been involved in strategic planning commonly perceive plans as a burden imposed on them, rather than as a better way of doing business. The Forest Service has found that forest plans are likely to work best—be acceptable to the public and implemented by the agency—if the forest supervisors were directly involved in their development (276). However, the forest planning process is complex and many pressures compete for a manager's time. Thus, managers are often only marginally involved in the planning process. Nonetheless, forest planning and management must become integrated, and the Forest Service is now providing training for forest supervisors and other employees on forest plan implementation.

Feedback and Control

Strategic planning is a continuous process, rather than a discrete act. Because it directs an organization's future, the strategic plan must be flexible enough to respond to economic and political changes. The Forest Service must also respond to natural disasters—fires, floods, hurricanes, volcanic eruptions, etc. Thus, one should not expect NFMA planning to be "done' it is an ongoing process of setting direction, of responding to feedback and to changing conditions, and of guiding actions and budget proposals. This is consistent with the NFMA requirements to amend plans as needed and to revise plans periodically.

Strategic planning requires that results—sales and profits in business; outputs, uses, and conditions for the national forests—be monitored to determine if the actions meet the organization's mission (241). If the results are unexpected and undesirable-if all the goals are not being achieved—actions can be modified to achieve the defined goals, or the plan amended to revise the goals, if necessary. Without periodic evaluation, the organization could continue in an unacceptable direction until litigation or some other unanticipated event forces a change. Thus, monitoring and feedback are essential to fulfilling the strategic planning process. However, as discussed in chapter 6, the Forest Service has done very little monitoring of forest plan activities.

Finally, strategic planning must be both centralized and decentralized in nature (101). It is centralized because the organization takes a comprehensive look at its situation and overall direction. Furthermore, the control systems—such as budgeting and performance appraisal-must be integrated and coordinated, to assure that the various units can be treated equitably. However, strategic plans must also be decentralized, so that individual units are appropriately distinguished and so that the managers have the flexibility to respond to local situations and are rewarded appropriately. The national strategic planning process under RPA sets the overall direc-

tion for the agency, and provides the centralized guidance for the agency. However, national production targets allocated to the national forests constrain flexibility to respond to local physical, biological, economic, and social conditions. Thus, forest planning must be consistent with the centralized guidance from RPA planning, but condition and output targets and plan implementation and evaluation must be decentralized, with each forest responding to its local situation.

Poor coordination among units is a common problem of strategic planning by corporations (101). The Forest Service is basically organized functionally—by resource. This structure has served the agency well for decades, but it inhibits integrated resource management. For example, the first round of forest plans was often reviewed in Forest Service regional offices and the Washington headquarters by resource staff specialists, who typically forced the plans "back in line with the traditional single-resource' approach (276,). Reorganizing the staff and budget structures for integrated resource management was one of the future challenges identified in the agency's recent critique of its forest planning process (276).

Another common strategic planning problem is inadequate links to control systems, such as budgets and incentives (101). Control systems guide performance. If the controls are inconsistent with the strategic direction, they can slow or even prevent successful implementation. In business, bonuses and promotions are often based on specific accomplishments, outputs, or programs. If these targets do not conform to the strategic goals, managers are more likely to ignore the strategic goals than their individual performance targets (241). Similarly, budgets that are not consistent with the strategic direction can shift management emphasis away from that direction.

The Forest Service has addressed part of the budget problem by calling for an integrated resource budget process (276), but creating a link between forest plans and annual budgets will require more than a new budget structure (215, 217). (See ch. 8.) Some critics of the agency have suggested that the current budget system encourages timber harvesting at the expense of other resources (187). Incentives and rewards related to the forest plan are equally important. Timber outputs have allegedly become so important that many past and current employees have expressed concern that the timber targets override other resource considerations (66, 90, 136). As discussed in chapter 9, strategic forest planning requires that the Forest Service reward systems be explicitly tied to preparing effective forest plans and to implementing those plans.

SUMMARY AND CONCLUSIONS

Controversy has always surrounded the national forests, The 1897 Forest Service Organic Act was enacted principally to limit presidential authority to establish reserves, and the authority to sell timber was a subject of debate. In 1911, the U.S. Supreme Court ruled that the Forest Service did have the authority to regulate and charge for grazing in the national forests. The Multiple-Use Sustained-Yield Act of 1960 (MUSYA) was enacted at Forest Service request, because of various efforts to reduce discretion over managing the national forests. The National Forest Management Act of 1976 (NFMA) was enacted because litigation threatened to halt clearcutting in the national forests, and thereby reduce Forest Service timber sales by half. Today, the controversies include debates about red-cockaded woodpeckers, about spotted owls and old-growth Douglas-fir forests, about below-cost timber sales, and about the level of administrative appeals and litigation. Controversies will probably always exist, because people care about the lands and resources of the National Forest System.

The national forests have always been managed to provide multiple uses and sustained yields. MUSYA further articulated the purposes for national forest management, but did not establish unambiguous goals for the national forests. The act presents a mix of uses, outputs, resources, and land classes as ''purposes, ' without giving much guidance on how to manage for the many uses and outputs. Multiple use is to ''meet the needs of the American people, ' while sustained yield suggests limiting use to sustainable levels. Taken together, the 1897 Organic Act and MUSYA direct management of the national forests to accommodate resource uses and produce resource outputs in the mix that people want, while protecting the lands and resources, and sustaining the ecosystems. NFMA added considerations for management and regulations for developing, amending, and revising the plans and for management standards and guidelines, while requiring public participation in defining the mix of resource values for each national forest.

RPA established a strategic planning process for the Nation's natural resources. RPA, as amended by the NFMA, also required the agency to prepare and revise land and resource management plans for the national forests. These plans can also be seen as strategic plans, consistent with the guidance in RPA and NFMA, with the purposes outlined in the Organic Act and MUSYA, and with the public disclosure required by the National Environmental Policy Act of 1969 (NEPA).

Strategic planning establishes the direction for an organization. Goals are measured in concrete terms so that everyone (managers, employees, and the public) understands the direction. As directed by MUSYA, NFMA, and other laws, the national forests are to accommodate uses and produce outputs, while protecting lands and sustaining ecosystems. (See ch. 4.) Forest plans must, therefore, identify the quantity, quality, and timing of these goals. A document that presents such a comprehensive picture of all uses, outputs, conditions, and sites could be overwhelming to produce and to understand. Rather, the agency could present the management direction by describing how management under the plan will change for key sites, important outputs, and critical resources and ecosystems. In essence, quantity and quality goals must be set for the outputs and conditions people are concerned about.

Strategic planning for the national forests must be based on sound information and analysis, but is not a precise, rational, scientific process. A Forest Service review of criticisms concluded that national forest planning is essentially political in nature (10), and in its recent internal critique, the agency noted that ''technical answers to social and political issues alienate many people' (276). Technical answers from computer programs were unlikely to be more acceptable for directing national forest management than was the professional expertise which had been rejected in the early 1970s in the Bitterroot controversy, the Monongahela lawsuit, and the enactment of NFMA. Strategic planning for government activities is rooted in public agreement-or working consensus, informed consent, or whatever term you choose to indicate that the management must be acceptable to the public. (See ch. 5.) Public involvement can be most effective, if: 1) the decisions to be made in the plan (and those to be postponed to another time or forum) are specified when planning is begun, and 2) the discussions and decisions focus on the needs and concerns of the interested and affected individuals and groups.

A strategic forest plan begins with an assessment of the current situation-what people want and are concerned about, and the land and resource conditions and trends that are relevant to those desires and interests. More and better data will not ''solve' forest planning problems, because strategic planning is not a rational, scientific process, but charting a course to the desired destination (the goals) depends on knowing the starting point. Inadequate data hamper strategic planning by restricting understanding of current conditions and direction. Furthermore, unless the data limitations are well known, technical analyses based on poor data provide apparently precise estimates of the consequences of various options and opportunities. (See ch. 7.) The incomplete and outdated information used in the forest plans, particularly on conditions- and impacts of concern to the public, has impeded strategic forest planning. (See chs. ***6*** and 8.)

If strategic planning is to have any value, the forest plans must be implemented. The plans are neither budget proposals nor ironclad commitments to actions or results, particularly since government agencies must request funds from a legislature. (See ch. 8.) Strategic plans must allow for the flexibility to respond to changing conditions, whether due to budget restrictions, political changes, or natural disasters. Nonetheless, the plans should guide budget requests and management activities. It is unclear, however, whether the forest plans are being implemented, because monitoring and evaluation of activities and results has generally been inadequate. (See ch. 6.) Plans are most likely to be implemented if managers recognize that planning is part of the job of managing a national forest, and are therefore closely involved in the planning process. (See ch. ***9.)***

Finally, strategic planning is a continuous process, with feedback to assess plan implementation. If the results differ unacceptably from those anticipated, the actions can be adjusted to achieve the desired goals, or the plan can be amended to modify the goals, if necessary. Without adequate monitoring, management could continue in an undesirable direction until forced to change by unexpected problems or litigation. (See chs. 5 and 6.)

A strategic planning process for the national forests is both centralized and decentralized—centralized for control and coordination, but decen-

tralized for flexibility to adapt to local physical, biological, social, and economic conditions. Direction for national forest planning from the RPA Program can provide the centralized coordination, but should not impose rigid requirements that hamper local flexibility. (See ch. 10.) Furthermore, the agency's traditional fictional organization structure has inhibited the integrated, interdisciplinary approach required in planning and appropriate in managing the lands and ecosystems, in assessing plans and activities, and in dealing with the public. (See ch. 9.) In addition, budgets and incentives must be linked to the goals set forth in the plan; the current budget system and performance appraisals emphasize commodity outputs over other use and condition goals, but managers must be held accountable for achieving all condition and output goals. (See chs. 8 and 9.)

Ultimately, managing the national forests is akin to managing **a** trust fund. A trust fund is to provide annuities for the beneficiaries, but the assets of the trust are to be protected and enhanced. Similarly, national forests are to be managed to provide the values that people want-the uses, outputs, and protection of special sites and resources. The assets of the national forests—the lands, resources, and ecosystems—are to be conserved and improved, to assure that the values they provide can be sustained. Strategic planning is an approach, consistent with the laws governing the management of the national forests, that can achieve these goals.

Chapter 4

The Legal Framework for Forest Planning and Management

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Chapter 4

The Legal Framework for Forest Planning and Management

During congressional oversight hearings in October 1989, Forest Service Chief Dale Robertson asserted that forest management had become increasingly ''complicated' by the series of laws that govern forest planning and plan implementation. Chief Robertson stated that, while each law serves a particular worthwhile purpose, taken together they impose serious burdens on planning and implementation:

> [T]rying to implement all of these laws does get to be an extremely difficult situation . . .
>
> Sometimes we feel like we are almost in an impossible situation because when we face these legal requirements of National Forest Management Act, NEPA, Endangered Species Act, Archaeological Resource Protection Act, the Clean Water Act, Clean Air Act, and all of these other laws,. . . people can pick our weakest link, and challenge us on our decisions, and delay or stop the best laid plans (206).

Some critics question the utility and efficacy of forest planning laws, believing these laws have not contributed to solving problems related to resource management, and even suggesting that the laws be repealed (18, 187). They further charge that the complex legal requirements have imposed a cumbersome and costly burden on the agency, subjecting it to increased threat of appeals and litigation stifling resource management, and accomplishing few of the objectives it was designed to achieve (79). "Documentation, consistency, and correct procedure become far more important than a land manager's solid, experienced judgment" (16).

Others defend the current legal framework as necessary to sustain the forest and rangeland ecosystems while accommodating uses and producing outputs. Some argue that the current problems exist because planning laws preserve too much agency discretion, and urge Congress to mandate more prescriptive management laws (76). The agency's current difficulties, they argue, result because the agency has failed to follow the spirit and intent of the existing environmental protection laws. Still others suggest that numerous administrative appeals and lawsuits result because the agency is not really listening to the public (277); the legal requirements might not seem so cumbersome, if the agency were more responsive to local public input and worked more closely with interested publics to solve conflict through deliberation and negotiation.

This chapter examines the general framework of laws governing land and resource management in the national forests and the implications of each on forest planning.[1] First, it examines the laws that primarily govern planning and management-the Forest Service Organic Act of 1897, the Multiple-Use Sustained-Yield Act of 1960, the National Environmental Policy Act of 1969, the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976. Then, it reviews certain laws that restrict activities to protect various resource values[2]--the 1964 Wilderness Act, the Wild and Scenic Rivers Act of 1968, the 1972 Clean Water Act, and the Endangered Species Act of 1973.

The chapter also briefly discusses the concern over the ''cumulative impact' of these laws on Forest Service planning and management. The complex web of laws may make forest planning and activities slower, costlier, and less efficient than necessary to produce and protect the various resource values. Moreover, some laws guide the setting of management direction based on local conditions and public participation, while other laws establish requirements or standards for specific resources, values, or sites. The difficulties posed by this legal web will be examined, but the thorough legal analysis needed to evaluate whether alternative

[1] A host of laws apply to some degree to forest management, including, but not limited to: the General Mining Law of 1872, *the* 1911 Weeks Law, *the* Migratory Bird Treaty Act of 1918, the Mineral Leasing Act of 1920, the Taylor Grazing Act of 1934, the 1%5 Land and Water Conservation Fund Act, the Archaeological Resource Protection Act, the Federal Land Policy and Management Act of 1976, the Clean Air Act Amendments of 1977, the 1978 American Indian Religious Freedom Act, the Public Rangelands Improvement Act of 1978, the 1980 Alaska National Interest Lands Conservation Act, and the 1987 Federal Onshore Oil and Gas Leasing Act. More thorough listings, with copies of the laws, can be found in *The Principal Laws Relating to Forest Service Activities (270)* and *Wildlands Management Law (232).*

[2] Some of the planning/management laws, notably NFMA, also establish restrictions on planning and management. However, they are included as direction-setting laws, because management guidance is their primary purpose.

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structures could provide comparable protection more efficiently is beyond the scope of this study.

SETTING DIRECTION FOR MANAGING THE NATIONAL FORESTS

Forest Service administration of the national forests is authorized and governed by several statutes that establish the agency's mission and generally define the scope of its regulatory and management authority. These laws include the 1897 Organic Act, the Multiple-Use Sustained-Yield Act of 1960 (MUSYA), the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), and the National Forest Management Act of 1976 (NFMA). The following discussion examines how each of these statutes has shaped the Forest Service's mission, the extent to which each directs the substance and procedure of planning and decision-making, and the extent to which each has broadened or narrowed the agency management authority and discretion. In addition, because of its important procedural requirements for forest planning, the National Environmental Policy Act of 1969 (NEPA) is also examined in this section.

The Forest Service Organic Act

In 1891, Congress gave the President the authority to reserve by proclamation any public domain lands "wholly or in part covered with timber or undergrowth, whether of commercial value or not . . ."[3] This authority was narrowed in 1897 when Congress defined the purposes for which such public lands could be reserved. This act, which has become known as the Forest Service Organic Act, provided that:

> No public forest reservation shall be established, except to improve and protect the forest within the reservation, or for the purpose of securing favorable conditions of water flows, and to furnish a continuous supply of timber for the use and necessities of citizens of the United States . . .

The forest reserves were created from public lands under the jurisdiction of the General Land Office in the Department of the Interior. Congress also authorized the Secretary of the Interior to manage and protect the lands by "mak[ing] such rules and regulations and establishing] such service as will insure the objects of such reservations, namely, to regulate their occupancy and use and to preserve the forests thereon from destruction" (89).

Early forest management focused primarily on the timber and range resources. Management planning for the forest reserves began in 1899, when the Department of the Interior began developing working plans" for timber harvesting in each of the established reserves (324). After the reserves and management agency were merged into the Bureau of Forestry in the Department of Agriculture in 1905, the chief of the newly created Forest Service, Gifford Pinchot, directed that working plans be developed for every timber sale, in part to facilitate timber harvesting, but also to avoid overcutting (324).

Forest Service planning and management of the range resources began largely in response to the perception that the public rangelands were being overgrazed by sheep. Thus, while the early timber planning efforts were to make timber available, the early range management efforts were more regulatory in nature, designed to protect water and other natural resources from the consequences of overgrazing (324). The agency charged fees for grazing rights to reduce overgrazing on some lands and withdrew certain other lands from grazing use entirely. The Organic Act and these early resource working plans firmly established both a utilitarian and protective tradition for resource management within the Forest Service, consistent with Chief Pinchot's views of proper resource management (196, 324).

The agency's authority to regulate the use and occupancy of the national forests was first challenged by ranchers who objected to Federal control over and fees for grazing livestock on traditionally grazed lands. However, in 1911, the U.S. Supreme Court upheld the agency's authority to regulate grazing through the imposition of "reasonable" user fees (240). Of greater importance, the court recognized that under the Organic Act the agency possesses broad regulatory authority over the "occupancy and use" of the forest reserves. The court held that the Secretary of Agriculture is required to make rules and regulations to protect the forest reserves 'from depredations and harmful uses, ' and

[3]Forest Reserve Act, Act of Mar. 3, 1891, ch. 561 (26 Stat. 1103; 16 U.S.C. 471). Repealed by section 704(a) of the Federal Land Policy and Management Act of 1976 (Act of Oct. 21, 1976, Public Law 94-579 (90 Stat. 2743)).

concluded that the Secretary is authorized "to regulate the occupancy and use and to preserve the forests from destruction."[4]

Since 1911, courts have consistently interpreted the occupancy-and-use language of the 1897 Organic Act as providing the agency with broad regulatory and management authority over the national forest lands. Courts have recognized that this authority includes, but is not limited to, the right to issue land use permits for large areas,[5] to regulate motorized recreation use,[6] and to regulate wildlife within the national forests[7] (324).

The Multiple-Use Sustained-Yield Act of 1960

MUSYA expanded the express regulatory and management authority of the Forest Service. MUSYA directed the Forest Service to administer the national forests for "outdoor recreation, range, timber, watershed, and wildlife and fish purposes. " (For a discussion of these purposes, see ch. 3.) MUSYA was intended to be consistent with the 1897 Organic Act, and thus reflects and perpetuates the utilitarian and protective visions embodied in the agency's traditions. In addition to recognizing principles of multiple use and sustained yield, MUSYA provided a clearer agency mission and established for the first time a statutory basis for the concept of integrated resource management. Nevertheless, MUSYA provided general guidance for national forest management without providing any specific substantive direction on how to balance the various resources or determine the appropriate mix of values generated by the national forests.

Courts have consistently recognized that MUSYA preserves the agency's already broad regulatory authority and wide discretion over the occupancy, use, and protection of the forests. The Ninth Circuit Court of Appeals has held that the language of the MUSYA "breathe[s] discretion at every pore."[8]

With MUSYA (and under the 1897 Organic Act), it was difficult to challenge Forest Service management decisions successfully. The Monongahela lawsuit successfully challenged long-standing Forest Service timber sale practices as violating specific requirements in the Organic Act for selling timber. However, agency discretion over management direction and the mix of resources values were virtually unchallengeable.

The National Environmental Policy Act of 1969

NEPA significantly altered the Forest Service's planning and management discretion. NEPA seeks to assure that all Federal agencies will incorporate environmental concerns into their decisionmaking Processes.[9] NEPA has been called 'the first comprehensive commitment of any modern state toward the responsible custody of the environment" (39).

Section 102(2)(C) of NEPA specifically requires that all Federal agencies evaluate and prepare a detailed written statement on the environmental impact of all proposals "for legislation or other major Federal actions significantly affecting the quality of the human environment." In 1978, pursuant to an Executive order from President Jimmy Carter, the Council on Environmental Quality promulgated regulations (40 CFR 1500-1508) setting more specific standards and guidelines governing the "NEPA process. " The regulations guide when environmental impact analyses and statements are required, direct that alternatives to the proposed action be evaluated, and set forth general standards for those processes.

The U.S. Supreme Court has held that NEPA has two objectives: 1) to obligate agencies to consider the environmental impacts of any proposed action, and 2) to require that the public be shown that the

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[4] *United States* v. *Grimaud*, 220 Us. *506.522(1911)*.

[5] *1111191 5,* Congress granted the Forest Service the authority to issue land use permits for areas up to 80 acres and for terms of up to 30 years (Act of Mar. 4, 1915, ch. 144 (38 Stat. 1101; 16 U.S.C. 497)). Courts have recognized the agency's authority to issue permits for larger land areas under this act in conjunction with the 1897 Organic Act; see *Wilson v. Block, 708* F. 2d 735 (D.C. Cir. 1983).

[6] *McMichael* v. United States, 355 F. 2d 283 (9th Cir. 1965).

[7] *Hunt* v. *United States,* 278 U.S. 96 (1928).

[8] *Perkins* v. *Bergland*, 608 F. 2d 803 (9th Cir. 1979). See also *Sierra Club v. Butz*, 3 ELR 20, 292 (9th Cir. 1973); *Hi-Ridge Lumber Co.* v. *United Stares,* 443 F. 2d 452 (9th Cir 1971).

[9] Section 2 of NEPA specifies that the purposes of the act are: "To declare a national policy which will encourage productive and enjoyable harmony between man and his environment to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; [and] to enrich the understanding of the ecological systems and natural resources important to the Nation . . .'

[10] *Baltimore* Gas & *Electric Co.* v. *NRDC, Inc.*, 4.62 U.S. at 97 (1982); *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 143 (1982).

agency has considered an action's environmental consequences.[10] The Court has also held that NEPA is a procedural rather than a substantive law, i.e., that it does not mandate certain outcomes or decisions. If an agency fully complies with the law's procedural requirements, the agency cannot be forced to modify its decision based on likely environmental effects or to mitigate those environmental impacts.[11] The procedural nature of NEPA has complicated its implementation, however, because the detailed NEPA requirements have largely evolved as "common law" in the Federal courts. To ensure that planning and decisionmaking procedures comply with NEPA standards, agencies must frequently consult an extensive and growing body of case law.

NEPA has had an extensive, though indirect, effect on national forest management. NEPA does not alter the Forest Service's mission, nor specifically narrow the agency's management and regulatory authority and discretion. It neither mandates certain mixes or combinations of resource values, nor requires the agency to select the most environmentally sound alternatives to proposed actions. Nonetheless, the impact of the extensive and complex NEPA procedures on agency decisionmaking should not be underestimated. NEPA has affected Forest Service planning and decisionmaking in two basic ways, consistent with the objectives of the act: consideration of environmental impacts, and full public disclosure.

The Forest Service has long considered the balance among resource uses in its planning and decisionmaking; MUSYA merely confined a long-standing Forest Service tradition of considering resource tradeoffs. However, by requiring an assessment of environmental impacts, rather than just a balance among uses, NEPA added environmental protection (over and above the MUSYA requirement to maintain the productivity of the land) as a consideration in national forest management. NEPA served as a catalyst for the integrated planning and management contemplated 10 years earlier by MUSYA (1, 324). Section 102(2)(a) of NEPA directs the use of an interdisciplinary approach in Federal planning and decisionmaking. This direction (together with similar direction in NFMA) has changed the agency's decisionmaking processes at all levels, and has prompted the agency to replace its traditional resource planning with planning for coordinated resource management (l). The requirements for interdisciplinary planning have also brought a more diverse collection of professionals to the agency.

The other significant impact on Forest Service planning and management is the full disclosure requirement. In response to NEPA, the Forest Service began to expand its public information and participation programs drastically (1, 231), and this, in turn, has meant closer public scrutiny. Furthermore, the agency's compliance with NEPA procedures are subject to closer judicial scrutiny than are decisions under management guidance. In 1976, the U.S. Supreme Court noted that courts will take a "hard look' at agency consideration of environmental impacts under NEPA, to assure that the decisions are not arbitrary and capricious.[12] Thus, through the closer public and judicial scrutiny of agency decisionmaking, NEPA has effectively required the Forest Service to keep a detailed and thorough record of its decisionmaking processes.

Finally, NEPA requires that environmental analyses be site-specific. This is difficult in forest planning, because the plans do not set forth specific activities and sites; such details are determined in project (or implementation) planning. Nonetheless, forest plans are required to be consistent with NEPA. The Forest Service now views the environmental impact statement accompanying the plans as ''programmatic," assessing the impacts of the programs (the plans). Site-specific environmental analyses conducted for specific projects are ''tiered' to the programmatic environmental impact analyses, without repeating the programmatic analyses.[13] In part because programmatic analyses can be several years old, agencies must supplement them when significant new information becomes available. Thus, forest and project planning and NEPA analyses are parts of a ''never-ending' interactive process (1, 280).

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[10] *Baltimore Gas & Electric Co. v. NRDC, Inc.*, 462 U.S. *at* 97 (1982); *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 143 *(1982).*

[11] *Strycker's B„ Neighborhood Council, Inc. v. Karlen*, 444 U.S. 223 (1980); *Robertson v. Methow Valley Citizens Council*, 19 ELR 20743 (USFS May 1, 1989).

[12] *Kleppa v. Sierra Club*, 427 U.S. 390 (1976).

[13] This view has evolved over the past few years, and thus many forest plans and accompanying environmental statements may not fit this description of the intertwined forest and project planning and environmental analysis.

The Forest and Rangeland Renewable Resources Planning Act of 1974

Congress enacted RPA to reassert its authority over Forest Service planning and decisionmaking. RPA applies to all four branches of the agency—the National Forest System, State and Private Forestry, Research, and International Forestry-and directs the agency to develop a long-term strategic planning process (259). As part of this strategic planning process, RPA required land and resource management plans for units of the National Forest System. However, except for requiring a "systematic interdisciplinary approach'' in developing these plans, RPA provided no substantive or procedural standards and guidelines for their development, until it was amended by NFMA in 1976.

The National Forest Management Act of 1976

NFMA established a complex series of procedural and substantive requirements for developing the long-term land and resource management plans (forest plans) required by RPA. Although NFMA neither modifies the principles of MUSYA nor directs any particular balance or mix of resource values, the extensive planning requirements have led some to dub it the agency's ''new Organic Act' (324). By setting forth a host of procedural and substantive standards and guidelines for planning and implementation, NFMA significantly affects Forest Service management and to some extent narrows the agency's regulatory and management discretion.

NFMA does not mandate specific output levels, determine the mix of values produced, or attempt to set priorities for resource managers. While embracing MUSYA, NFMA provides more substance to the principles of multiple use and sustained yield, and consequently offers additional guidance to the agency on forest planning. NFMA establishes a planning process to set goals and objectives for national forest management and to identify: 1) standards and guidelines for management, 2) proposed and possible activities, and 3) the necessary financial resources.

NFMA serves three basic functions. First, it directs the agency to prepare long-term integrated forest plans for each national forest, to be amended or revised as needed, but revised at least every 15 years. Next, it requires regulations establishing substantive standards and guidelines for timber management and for the protection of water and other renewable resources. And finally, it expressly provides for active public involvement in the planning process. The following discussion examines these functions, and discusses their implications for managers.

Developing National Forest Plans

The forest planning process is comprised of three components: development, approval, and implementation. Section 6(f)(5) of NFMA directed the Forest Service to attempt to complete the initial round of forest plans by September 30, 1985, and to revise each plan at least every 15 years. When developing forest plans, the agency is required to adhere to the principles of MUSYA and to follow the procedural requirements of NEPA. NFMA embraces the concept of integrated planning through interdisciplinary analysis; each national forest shall employ an interdisciplinary planning team (section 6(f)(3)) to use a "systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences' (section 6(b)). Plans must be based on "inventory data on the various renewable resources' of the forest (section 6(g)(2)(B)). NFMA also directs that implementing regulations specify guidelines for forest plans to ensure that plans achieve the goals of the RPA program (section 6(g)(3)).

Once a plan has been developed (with public involvement), it must be approved by the regional forester who, after reviewing the plan, must submit a Record of Decision. If approved, the plan becomes final and implementation can begin. Under Forest Service regulations (36 CFR 217), final forest plans are subject to administrative appeals—an additional administrative review initiated by members of the public. (See ch. 5.) Plans are also subject to legal challenge, under the Administrative Procedures Act, since NFMA contains no specific provision for judicial review of forest plans.

Forest plans are developed using the principles of strategic planning-setting direction, developing targets for outputs and conditions, and establishing standards and guidelines for implementation. (See ch. 3.) Plans are generally programmatic in nature; rather than making site-specific decisions on uses and outputs, plans set general goals and guidelines, which direct activities on the ground. Nonetheless, section 6(f)(2) of NFMA also requires the plans to reflect ''proposed and possible actions, including

the planned timber sale program . . . necessary to fulfill the plan." The plan does not make such project decisions, but does set goals and objectives, establish management standards and guidelines, and identify management prescriptions (scheduled combinations of activities for management areas), and subsequent project decisions must be consistent with the plan.

Until they are amended or revised, final forest plans are the primary guidance for Forest Service actions on the ground. NFMA provides that if an amendment would result in a ''signiilcant change, ' the agency must provide for public involvement comparable to that allowed for plan development (section 6(f)(4)). Entire plans shall be revised when the agency finds that conditions on a forest ''have significantly changed, " but at least every 15 years (section 6(f)(5)). Whether such changes are "significant'' is to be determined at the discretion of the agency. Pursuant to NFMA, the Secretary of Agriculture promulgated regulations in 1979 (revised in 1982), which set forth specific procedures for resource inventorying and monitoring, and for plan development and implementation. The Forest Service has begun the process of revising the planning regulations, with the 'Advanced Notice of Proposed Rulemaking" published in the ***Federal Register*** on February 15, 1991.

Guidelines for Timber Management and **for** Resource Protection

Although NFMA is primarily a procedural law, it does require regulations setting forth substantive standards and guidelines. Most of the substantive requirements apply to timber management practices, while the others generally provide guidance for protecting water, plant, and animal resources. Many of these provisions narrow the agency's management discretion to various degrees.

Because NFMA was passed largely in response to litigation over the agency's timber management practices, it is no surprise that much of the law is focused upon regulating those practices. NFMA includes provisions that limit the location, methods, and amount of timber production that may take place within the national forests. NFMA requires regulations that specify that:

1. increases in harvest levels are based on intensified management practices, only if such practices can be done in accordance with MUSYA and are successfully implemented (section 6(g)(3)(D));
2. timber harvesting is allowed only on those lands where "soil, slope, or other watershed conditions will not be irreversibly damaged" (section 6(g)(3)(E)(i));
3. timber harvesting is allowed only where there is 'assurance that such lands can be adequately restocked within 5 years" (section 6(g)(3) (E)(ii));
4. "protection is provided for streams, lakes, shorelines, and other wetlands from detrimental changes" from timber harvesting (section 6(g)(3) (E)(iii));
5. the harvesting system ''is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber' (section 6(g)(3) (E)(iv));
6. clearcutting is used where "it is determined to be the optimum method . . . to meet the objectives and requirements of the relevant land management plan" (section 6(g)(3)(F)(i); and
7. ''maximum size limits for areas to be cut in one harvest operation" are established (section 6(g)(3) (F)(iv).

NFMA also generally prohibits the sale of timber from lands identified as not suited for timber production and generally limits sales to sustainable levels. Specifically, section 6(k) prohibits timber harvesting on lands identified as:

> . . . not suited for timber production, considering physical, economic, and other pertinent factors to the extent feasible . . . except for salvage sales or sales necessitated to protect other multiple-use values . . .

Section 14(a) directs the Secretary to:

> . . . limit the sale of timber from each national forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis . . .

The annual sale quantity is allowed to fluctuate above and below the average for each decade. A plan can also depart from this 'non-declining even flow' level of timber harvesting, if the departure is ''consistent with the multiple-use management objectives . . . [and] made with public participation. '

Many of the evaluations and determinations admittedly require the professional judgment of agency personnel, and thus are substantially discretionary in nature. Nevertheless, these provisions

establish a mandatory framework for making decisions on timber harvesting, and consequently limit to some degree the traditional discretion of the agency to regulate and manage timber harvesting.

The various provisions that constrain timber management were enacted to limit the impacts of timber harvesting on other forest resources. Congress appeared especially concerned about the potential impacts of logging practices on water and fisheries. NFMA contains other provisions aimed at protecting resources from impacts of timber harvesting, mineral development, recreation, and other uses on forest resources. Section 6(g)(3)(B), for example, directs that forest plans should protect biological diversity within the national forests.[14] Specifically, the regulations for forest planning should include guidelines to:

> . . . provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives . , .

Section 6(g)(3)(C) essentially requires research and evaluation, through continuous monitoring and field assessment of the effects of management, to ensure that the productivity of the land is not substantially and permanently impaired.

Public Involvement

The third basic function of NFMA is to provide for active public involvement. NFMA (in conjunction with NEPA) seeks to assure that before proceeding with certain actions and programs, the agency informs and involves the public in decisionmaking. By opening up the agency's decisionmaking processes to closer public and congressional scrutiny, NFMA has increased agency accountability and decreased discretion. (See ch. 5).

Implications for Managers

NFMA and the other direction-setting laws provide guidance for establishing output and condition targets for the national forests and standards and guidelines for management with public participation. In forest planning, the agency must consider alternative approaches for managing the lands and resources, and must evaluate the potential site-specific and cumulative impacts of management options. Failure to comply with NFMA procedures can prevent the agency from proceeding with a particular action. NEPA seeks to assure that environmental considerations become an integral part of decisionmaking, and NFMA adds the requirement that actions be implemented in a manner that does not seriously impair the forest lands, resources, or productivity.

The actual impacts of NFMA on Forest Service management discretion cannot be known precisely. While the law requires regulations constraining the use of certain practices that might have significant adverse impacts, the determination of significance is largely a matter of agency discretion. In addition, courts remain relatively deferential to the agency's management discretion under NFMA. In one example, the court acknowledged that soil erosion from a proposed road construction would have major consequences on the water of a nearby stream, but upheld the agency's decision to proceed with the project as planned, stating that, "[l]ike the Multiple Use, Sustained Yield Act [sic], the NFMA requires that national forest lands be managed with due consideration given to environmental values . . . Here, the balancing of competing values struck by the Forest Service . . . was not so insensitive to environmental concerns that it violates the NFMA."[15]

Relatively few court decisions have interpreted agency discretion under NFMA since the initial forest plans have been completed. Thus, it may be premature to speculate on the degree to which courts will defer to agency management discretion in the future. However, the numerous procedural and substantive NFMA requirements for forest planning make more agency decisions subject to administrative and judicial review. It is possible that the administrative and judicial challenges to agency plans and decisions will be unprecedented. The precise impacts of the threat of appeals and litigation on agency decisionmakers is unknown, but it is indisputable that increased accountability under

[14] The term "biological diversity" has become relatively common since the enactment of NFMA, and often encompasses diversity at a variety of levels, such as genetic diversity, species diversity, and ecosystem diversity. NFMA's term---diversity of plant and animal communities-is akin to ecosystem diversity for the national forests. The regulations go further, suggesting species diversity by requiring that "fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species" (36 CFR 219.19). In this report, biological diversity in national forest management is used as a synonym for the diversity of plant and animal communities.

[15] *Northwest Indian Cemetery Protective Association* v. *Peterson*, 565 F. Supp. 586, 606 (N.D. Cal. 1983), modified, 764 F.2d 581 (9th Cir. 1985), *rev'd in part sub nom, Lyng v. Northwest Indian Cemetary Protective Association, 485* U.S. 439 (1988).

Box 4-A—Special Congressional Attention for the Tongass National Forest

The Tongass National Forest, in southeast Alaska, has received more congressional attention and direction than any other national forest in the United States. The Tongass is unique in many ways. It is the largest national forest, encompassing more than 16.7 million acres, and is more than 5 times larger than any other forest (except the 5.7 million-acre Chugach, the other national forest in Alaska). It contains perhaps the largest stretch of undisturbed temperate rainforest in the world. It also has been the focus of Forest Service efforts to establish a timber industry since the 1920s (291).

The Tongass contains more designated wilderness than any other national forest. The 5.75 million acres account for more than a third of the land in the forest. In addition, Congress has created two national monuments with 3.25 million acres in the Tongass National Forest. Glacier Bay and Admiralty Island are the only major national monuments in the National Forest System.[1] (Other national monuments in the National Forest System were transferred to National Park Service management in 1933.) The Alaska National Interest Lands Conservation Act of 1980 (ANILCA)[2], which created these areas, contains substantial directions as to their management.

In addition to wilderness and national monument designations (and many other provisions), ANILCA established the Tongass Timber Supply Fund, a permanent appropriation (see ch. 8) of $40 million annually to prepare 4.5 billion board feet of timber over the ensuing decade. The subsequent debate over financial losses from timber sales (below-cost sales) led many to question the appropriateness of this permanent appropriation. After several years of debates, Congress enacted the Tongass Timber Reform Act in 1990.[3] This Act terminated the Tongass Timber Supply Fund, directed modification of the existing long-term timber sale contracts (scheduled to terminate in 2004 and 2011), and increased the amount of wilderness designated in the Tongass.

Thus, the Tongass National Forest is unique in size, forest type, extent of wilderness, presence of national monuments, and creation and subsequent termination of the timber fund. The management of this unique national forest has received unparalleled attention from Congress.

[1]The National Forest System also contains the 80,682-acre Mount St. Helens National Volcanic Monument in Washington.

[2]Act of Dec. 2, 1980, Public Law 96-487 (94 Stat. 237).

[3]Act of Nov. 28, 1990, Public Law 101-626 (104 Stat. 4426).

NEPA and NFMA has lead to a greater emphasis on documenting decisions.

ADDITIONAL LEGAL CONSTRAINTS ON THE FOREST SERVICE

The laws examined above set out the general planning and management framework for the Forest Service. Most of these laws are procedural in nature and provide only general guidance to the agency on how to balance resource management. In addition to these laws, numerous statutes not specifically written for the national forests circumscribe forest planning and management. The purposes of these laws are typically to protect particular resources or sites, and thus the laws frequently impose substantive constraints or limitations on activities. (See box 4-A.) This section describes the four major resource or site protection laws affecting Forest Service management.[16]

The Wilderness Act

The Wilderness Act, enacted in 1964, maybe the most law most restrictive to Forest Service management discretion, because it prohibits or restricts various uses in particular areas of the national forests. The purpose of the act is to preserve natural areas for recreation and other purposes. Lands are included in the National Wilderness Preservation System by act of Congress from those Federal lands where:

> . . . the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of. . . undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habita-

[16]The national forests contain only two systems of special management areas — the National Wilderness Preservation System and the National Wild and Scenic Rivers System. The national forests also contain numerous other special management areas, typically designated by Congress individually and with particular management guidance for each area. For more on these areas, see *Special Management Areas in the National Forest System (296).*

tion, which is protected and managed so as to preserve its natural conditions (section 2(c)).

Congress did not view designated wilderness areas within national forests as conflicting with the general direction for national forest management. Section 4(a)(1) of the Wilderness Act specifically states that:

> . . . [n]othing in this Act shall be deemed to be in interference with the purpose for which the national forests are established as set forth in the Act of June 4, 1897 [the Forest Service Organic Act], and the Multiple-Use Sustained-Yield Act of 1960.

Despite such statements, the Wilderness Act effectively limits Forest Service discretion for managing designated wilderness areas within the national forests. Section 4(b) states that:

> . . . each agency administering any area designated as wilderness shall be responsible for preserving the wilderness character of the area and . . . wilderness areas shall be devoted to the public purposes of recreational, scenic, scientific, educational, conservation, and historical uses.

To achieve these purposes, section 4(c) expressly prohibits commercial enterprise, permanent or temporary roads, motorized and mechanical transport, and structures and installations in wilderness areas, except for existing private rights and minimum administrative requirements. However, the Wilderness Act also provides numerous exemptions to these restrictions:

1. motorboat and aircraft access "may be permitted to continue, ' where such use existed prior to designation (section 4(d)(l));
2. measures may be taken for ''the control of fire, insects, and diseases" (section 4(d)(l));
3. mineral prospecting and information gathering on other resources is permitted 'if such activity is carried on in a manner compatible with the preservation of the wilderness environment" (section 4(d)(2));
4. activities under valid existing mineral rights (which could be established on or before ***December 31, 1983) ''necessary*** in exploring, drilling, producing, mining, and processing operations' are permitted, ''subject to such reasonable regulations governing ingress and egress as maybe prescribed" (section 4(d)(3));
5. the President may authorize water and power projects, and associated activities, "needed in the public interest" (section 4(d)(4)(l));
6. livestock grazing ''shall be permitted to continue subject to such reasonable regulations as are deemed necessary' (section 4(d)(4)(2)); and
7. "commercial services may be performed . . . for activities which are proper for realizing the recreational or other wilderness purposes of the areas" (section 4(d)(6)).

In addition, many of the subsequent statutes adding areas to the National Wilderness Preservation System have established similar exceptions for particular sites and activities, typically to permit existing uses to continue after the areas have been designated.

Nonetheless, the Wilderness Act clearly limits agency activities in planning and managing the designated areas. (See box 4-B.) Despite the numerous exemptions from the general restrictions, certain uses—most notably timber harvesting and developed recreation—are prohibited in wilderness areas. Furthermore, even for the exemptions, the agency is restricted as to the location and extent of permissible activities. Thus, the Wilderness Act significantly narrows Forest Service management discretion, and limits choices available in national forest planning for designated areas.

The Wild and Scenic Rivers Act of 1968

The Wild and Scenic Rivers Act of 1968 is intended to preserve and protect the unique values of certain rivers and their surrounding lands. Specifically, section l(b) of the act directs that selected rivers with ''outstandingly remarkable scenic, recreation, geologic, fish and wildlife, historic, cultural, or other similar values, be preserved in free-flowing condition, and that they and their immediate environments shall be protected for the benefits and enjoyment of present and future generations. ' The act requires agencies (including the Forest Service) to report to the President on the suitability or nonsuitability of rivers within their jurisdiction for addition to the National Wild and Scenic Rivers System, and the President makes recommendations to Congress. Congress then designates components

Box 4-B—Release Language and Management of Roadless Areas Not Included in the National Wilderness Preservation System

In addition to planning for the management of wilderness areas, the National Wilderness Preservation System affects national forest planning in another way. The Wilderness Act reserved to Congress the authority to designate wilderness areas, but directed the Forest Service to present recommendations on the wilderness suitability of the existing primitive areas within the national forests.[1] In addition, section 2 of the Multiple-Use Sustained-Yield Act of 1960 (MUSYA) acknowledged that "The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act." Since wilderness is an accepted use of national forests under MUSYA, potential wilderness designations are to be examined in the forest planning process under the National Forest Management Act of 1976 (NFMA), along with other possible uses of the national forests.

Historical Developments

In 1970, the Forest Service chose to expand the required primitive area review to include many roadless areas, but this first Roadless Area Review and Evaluation (RARE I) was abandoned in 1972 because of a lawsuit asserting that the Forest Service violated the National Environmental Policy Act (NEPA) in deciding which lands to review (299). In 1977, the Forest Service began a second roadless area review. RARE II differed from the first review, because it was intended to accelerate this aspect of the NFMA planning process, and thus was to be consistent with MUSYA and NEPA.

The Forest Service presented its RARE II recommendations in an environmental impact statement (EIS) on January 4, 1979, and President Jimmy Carter presented those recommendations to Congress, with some modifications, on April 16. The State of California challenged the Forest Service RARE II recommendations for 47 areas to nonwilderness uses in July. In January 1980, the court ruled that the RARE II EIS violated NEPA, and the decision was substantially upheld on appeal in October 1982.[2] Because of this ruling, the Reagan Administration chose to reevaluate the RARE II recommendations in the ongoing NFMA planning process, except in those States with wilderness laws containing certain provisions.

The California lawsuit raised questions about limitations on management activities in areas not recommended for wilderness. Congress chose to address the issues with two provisions in wilderness laws. The first, known as "sufficiency" language, proclaimed the RARE II EIS as sufficient to meet Congress' needs for the specified areas (typically all national forest lands in a State), and preclude judicial review of RARE II for those areas.

The second provision, known as "release" language, provided guidance on the timing of future wilderness reviews and on the interim management of roadless areas. Several versions of release language were developed, but the 1980 version and 1984 modification are the only two enacted (294). Both of these versions were permissive. First, the Forest Service was not required to review the wilderness suitability of released roadless areas until the initial NFMA plans were revised, unless the agency chose to conduct such a review. Also, the Forest Service was not required to protect the wilderness characteristics of released roadless areas, at least if the forest plan called for activities that would modify the area's characteristics.[3]

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[1] The Forest Service had administratively created a system of wilderness, wild, and primitive areas beginning in 1924. The Wilderness Act established the National Wilderness Preservation System with the existing 9.1 million acres of administratively designated wilderness and wild areas, and directed the evaluation of wilderness suitability of the primitive areas.

[2] *California* v. *Bergland*, 483 F. Supp. 46S (E.D. Cal. *1980), aff'd in part, rev'd in part, California* v. *Block*, 690 F. 2d 753 (9th Cir. 1982).

[3] Alternative versions would have prohibited subsequent reviews of wilderness suitability, forever or until a specified date, and may have required development of released areas.

of the System, based on, but not limited to, agency and Presidential recommendations.[17]

The Wild and Scenic Rivers Act establishes guidelines for managing the lands surrounding designated rivers. The agency charged with administering the river is directed to establish boundaries around the selected river (within the limits specified in the act), and to develop a management plan for protecting the area. In particular, section 10 specifies that:

> (a) Each component of the national wild and scenic rivers system shall be administered in such reamer as to protect and enhance the values which

[17] In contrast to the National Wilderness Preservation System, where only Congress *can designate* areas, State legislatures can designate additions to the National Wild and Scenic Rivers System, with the approval of the U.S. Secretary of the Interior.

Current Issues

Since the RARE II recommendations were issued in 1979, Congress has enacted statutes designating wilderness and containing sufficiency and release provisions for most States. For the few States without such laws, such as Idaho and Montana, the legal status of the RARE II EIS is irrelevant, because the RARE II recommendations have been supplanted by recommendations in NFMA plans for the national forests in those States. Clearly, sufficiency language to insulate the RARE II EIS from judicial review is no longer relevant. However, it is unclear whether release language is necessary for forest plan decisions to develop. areas not recommended for wilderness.

Is Release Language Needed?

In some respects, release language is appropriate. The Wilderness Act reserves to Congress the right to decide on the extent and location of the National Wilderness Preservation System. The Forest Service provides Congress with recommendations, developed through the planning process to consider site-specific tradeoffs and with public involvement. Nonetheless, they are only recommendations. Congress is the final arbiter, and perhaps should decide on the areas released from wilderness protection, as well as on those to be protected.

In addition, release language seems to work. The Forest Service has not been successfully sued over decisions to develop roadless areas because of the need to protect wilderness characteristics. In the only case involving release language,[4] the court held that the release language in the Alaska National Interest Lands Conservation Act of 1980 excused the Forest Service from having to examine the wilderness option for Tongass National Forest lands until the NFMA plan for the Tongass was revised (98). However, the plan was still required to consider a range of management intensities, from primitive conditions through environmentally compatible activities to intensive management, and release language did not permit the agency to develop areas without considering other environmental protection laws.

Is Release Language Unnecessary?

On the other hand, release language may be unnecessary. Release and sufficiency provisions were developed, because RARE II violated NEPA, in part because RARE II contained inadequate site-specific information on the consequences of the recommendations. However, forest planning under NFMA is required to conform with the requirements of NEPA. Thus, if forest planning fulfills the legal conditions, wilderness recommendations in forest plans will not be subject to lawsuits under the precedent established in the California lawsuit. Furthermore, it is questionable whether forest planning and Forest Service decisions should be exempt from judicial review, and there may be little basis for exempting wilderness recommendations but not other decisions.

Furthermore, wilderness recommendations in forest plans may not be subject to judicial review. In a recent case,[5] the court held that the forest plan does not make an irrevocable commitment to development of specific areas, and that judicial review of NEPA compliance should be deferred to project-level decisions (280). Broadly applied, this decision could make release language, at least for wilderness recommendations in forest plans, irrelevant.

[4] *City of Tenakee Springs* v. *Block*, 778 F .2d 1402 (9th Cir. 1985).

[5] *Idaho Conservation League* v. *Mumma*, CV 88-197-M-CCL (D. Mont. decided Aug. 7, 1990).

caused it to be included in said system without, insofar as is consistent therewith, limiting other uses that do not substantially interfere with public use and enjoyment of these values. In such administration primary emphasis shall be given to protecting its esthetic, scenic, historic, archaeological, and scientific features. Management plans for any such component may establish varying degrees of intensity for its protection and development, based on the special attributes of the area.

Section 12(a) then adds that each agency:

> 0.. shall take such action respecting management policies, regulations, contracts, [and] plans, affecting such areas ... as may be necessary to protect such rivers in accordance with the purposes of this Act. . . Particular attention shall be given to scheduled timber harvesting, road construction, and similar activities which might be contrary to the purposes of this Act.

In contrast to the Wilderness Act, the Wild and Scenic Rivers Act is neither prescriptive nor proscriptive; rather it allows the Forest Service to determine what management goals and activities are consistent with the purposes of the act. Nonetheless, the act does emphasize management for esthetic, scenic, historic, archaeological, and scientific val-

ues, and requires protecting and enhancing the values that led to the river being designated. Consequently, Forest Service discretion in planning for the management of these areas is narrowed significantly.

The Clean Water Act

Congress established stricter standards for protecting the Nation's water resources in 1972 when it revised the Federal Water Pollution Control Act, also known as the Clean Water Act.[18] The purpose of the Clean Water Act is to enhance water quality by imposing limitations on sources of pollution. The act allows States to set their own water quality standards, equal to or more restrictive than the Federal standards, and requires Federal agencies to comply with the State standards.

The Clean Water Act provisions having the greatest impact on Forest Service management are those regulating nonpoint source pollution. Unlike point source pollution, which originates from a discrete, identifiable source such as a ditch or pipe, nonpoint source pollution refers to pollution originating over a widespread land area, such as from agricultural, mining, or silvicultural activities. National forest activities that might generate nonpoint source pollution include, but are not limited to, timber harvesting, livestock grazing, off-road vehicle use, and road and trail construction and maintenance.

The Clean Water Act was amended in the Water Quality Act of 1987[19] to require the States to develop standards for regulating nonpoint source pollution. When combined with the requirement for Federal agencies to comply with State water quality standards, the State standards for nonpoint source pollution become a critical consideration for the Forest Service (6). While NEPA only requires the Forest Service to evaluate and consider the impacts of management activities on watersheds and water quality, the Clean Water Act prohibits the agency from engaging in activities that would cause impacts in excess of Federal or State water quality standards. Thus, Federal and State water quality laws impose substantive, enforceable limits on national forest management—the State water quality standards represent a minimum level of protection, which the Forest Service must observe. Consequently, in forest planning, the Forest Service is not allowed the discretion simply to weigh the impacts on water quality against the anticipated benefits from a particular use.

The Forest Service has attempted to meet State water quality standards by requiring forest plans to include Best Management Practices (BMPs) for protecting water quality. However, courts have ruled that, even when the U.S. Environmental Protection Agency and the relevant State agency approve the BMPs, the use of BMPs does not guarantee compliance with State water quality standards .[20] BMPs are only a means to achieve those standards, not a replacement for the standards (6, 7). The Forest Service must not only plan to use BMPs, but must also show that their practices comply with State water quality standards. Thus, the Clean Water Act substantially narrows agency discretion.

The Endangered Species Act of 1973

The Endangered Species Act of 1973 (ESA) is another environmental protection law with potentially serious implications for forest planning and management. As is apparent in the current controversies over the northern spotted owl in the Pacific Northwest and the red-cockaded woodpecker in the Southeast, the designation of a plant or animal species as threatened or endangered under ESA can alter Forest Service planning considerations and management discretion.

ESA recognizes that various species of fish, wildlife, and plants "have been so depleted in numbers that they are in danger of or threatened with extinction" (section 2(a)(2)), but they are of "esthetic, ecological, educational, historical, recreational, and scientific value" (section 2(a)(3)). The purposes of the act are to provide: 1) a mechanism for conserving ''the ecosystems upon which endangered species or threatened species depend,' and 2) a program for conserving those species (section

[18] The Federal Water Pollution Control Act had been erected in 1948 (Act of June 30, 19@, ch. 758 (62 Stat. 1155)) and amended numerous times prior to its complete revision in the Federal Water Pollution Control Act Amendments of 1972. This revision was subsequently amended in the Clean Water Act of 1977, and the combination is commonly referred to as the Clean Water Act.

[19] Act of Feb. 4, 1987, Public Law 100-4 (101 Stat. 7; 33 U.S.C. 1251 et seq.).

[20] *Northwest Indian Cemetery Protective Association v. Peterson*, 565 F. Supp. 586,606 (N.D.Cal.1983), *modified*, 764 F.2d 581 (9th Cir. 1985), *rev'd in part sub nom. Lyng v. Northwest Indian Cemetary Protective Association*, 485 U.S. 439 (1988).

2(b)). ESA also defines conserving the species as bringing "any endangered species or threatened species to **the** point at which the measures provided pursuant to this act are no longer necessary' (section 3(3)). Thus, for ESA, conservation is synonymous with recovery of the species.

ESA is administered by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS). Section 4(a)(1) of the act requires USFWS and NMFS to determine if species are threatened or endangered by: 1) destruction or modification of habitat, 2) overutilization, 3) disease or predation, 4) inadequate regulatory mechanisms, or 5) other natural or human factors. The determination is to be based ''solely on the best scientific and commercial data available" (section 4(b)(l)(A)). Congress gave specific directions ***not*** to include economic effects in determining if species are threatened or endangered; the report on the 1982 ESA amendments from the House Committee on Merchant Marine and Fisheries states:

> The addition of the word "solely" is intended to remove from the process of the listing or delisting of species any factor not related to the biological status of the species. The Committee strongly believes that economic considerations have no relevance to determinations regarding the status of species and intends that economic analysis requirements . . . not apply (258).

Section 4(a)(3)(A) requires the designation of "any habitat of such species which is then considered to be critical habitat. Critical habitat is also to be based on the best scientific data available, but in contrast to the listing decision, the USFWS or NMFS is to consider 'the economic impact, and any other relevant impact, of specifying any particular area as critical habitat" (section 4(b)(2)).

ESA establishes three considerations of endangered or threatened species for national forest planning and management. First, a recovery plan is to be developed for endangered and threatened species (section 4(f)), focusing on species that ''conflict with construction or other developmental projects or other forms of economic activity. " The services of 'appropriate public and private agencies and institutions, and other qualified individuals' are to be procured, but recovery teams are exempt from the Federal Advisory Committee Act (FACA). When national forest lands are involved, Forest Service employees are likely to be included in recovery planning teams, and thus, recovery plans and national forest planning can be coordinated.

The second ESA consideration in forest planning, in section 9 of the act, is a prohibition on the "taking" of any species which has been designated as endangered. "Taking" is defined to mean "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" (section 3(18)). Section 10 defines conditions under which the taking of an endangered species would be permitted.

Finally, section 7(a)(2) of ESA directly affects Federal agency actions by specifying that:

> Each Federal agency shall, in consultation with and with the assistance of the Secretary [of Interior and of Commerce], insure that any action authorized, funded, or carried out by such agency. . . is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat . . .

Following the consultation, the Secretary is to issue an opinion on whether the actions will jeopardize the endangered or threatened species or will adversely modify the designated critical habitat. If jeopardy or adverse modification is identified, the Secretary must then suggest a reasonable alternative for achieving the results without jeopardizing the species or adversely modifying its critical habitat. Specifically, section 7(b)(3)(A) states that:

> Promptly after conclusion of the consultation , . . . the Secretary shall provide . . . a written statement setting forth the Secretary's opinion, and a summary of the information on which the opinion is based, detailing how the agency action affects the species or its critical habitat. If jeopardy or adverse modification is found, the Secretary shall suggest . . . reasonable and prudent alternatives . . .

The Endangered Species Act could have serious implications for Forest Service management and planning. Recovery plans can affect national forest plans, since NFMA requires forest plans to be ''coordinated with the land and resource management planning processes of . . . other Federal agencies" (section 6(a)). Furthermore, any action that constitutes a' 'taking' under ESA is strictly prohibited. Finally, the Forest Service is required to consult with the Fish and Wildlife Service on plans and activities that might jeopardize threatened or endangered species or that might adversely modify critical

habitat. Because of the programmatic and strategic nature of forest planning, it is virtually impossible to determine in advance whether particular management activities under the plan will lead to a finding of jeopardy or adverse modification. Thus, the section 7 consultation process is an ongoing one. To the extent that national forest plans and activities conflict with ESA's requirements, amendments and/or revisions to the plans may be necessary.

SUMMARY AND CONCLUSIONS

The legal framework for national forest planning and management consists of two types of laws: direction-setting laws and protection-standards laws. The direction-setting laws include the 1897 Forest Service Organic Act, the Multiple-Use Sustained-Yield Act of 1960, the Forest and Rangeland Renewable Resources Planning Act of 1974, and the National Forest Management Act of 1976. These laws essentially create an open planning process through which values are balanced and tradeoffs are evaluated in national forest management. The National Environmental Policy Act of 1969 augments these direction-setting laws by requiring the Forest Service to consider environmental impacts and to show the public how those impacts were considered.

The protection-standards laws typically apply to much more than just the Forest Service, and establish standards for protecting particular resources or sites. Some of the most important ones for national forest planning and management include the Wilderness Act, the Wild and Scenic Rivers Act of 1968, the Clean Water Act, and the Endangered Species Act of 1973. These statutes differ from the direction-setting laws, because they are not premised on balancing resource values, but on maintaining minimum standards for resource or site protection. Furthermore, these laws were passed at different times over the past few decades, and serve different, sometimes overlapping or even contradictory, purposes. Nonetheless, because these laws establish specific standards or restrictions, the Forest Service must comply with their legal requirements.

The complex web of laws, some requiring a balancing of values and others establishing standards or restrictions, has raised two concerns. The frost, articulated by Forest Service Chief Dale Robertson, is that the numerous compounding and possibly conflicting requirements make national forest planning and management an exceedingly complicated task. At the extreme, the sum total of the various protection standards and restrictions may make any on-the-ground management actions infeasible.

To date, the "cumulative impact" of the various laws on Forest Service management has not been extensively analyzed, nor is it known whether the collective purposes of these laws can be realistically achieved while maintaining historic levels of national forest uses and outputs. However, such legal analyses are beyond the scope of this study. Congress could consider commissioning such analyses by an independent organization with the necessary legal expertise. Congress could even consider modifying the protection-standards laws for national forest management, to allow the goals of these laws to be balanced with other values in national forest planning. Again, however, analyzing the implications of such an option is beyond the scope of this study and of OTA's mandate.

The second concern is that the complexity of the legal framework, and especially of the process laws such as NFMA and NEPA, lead agency managers to focus on "bomb-proofing" their management plans. Planning must follow correct procedures and be thoroughly documented, and decisions must be consistent—regardless of the validity, appropriateness, or acceptability of the plans and decisions—because proper procedure, documentation, and consistency are necessary to demonstrate that the decisions are not arbitrary and capricious (16).

This concern is predicated on two assumptions. The first is that the judicial system examines only whether the agency has followed the letter of the law. When agencies are sued, the courts do rule on whether agencies have fulfilled their legal requirements, especially for laws with specific standards or constraints. For example, the Forest Service ***must*** meet State water quality standards, and it ***must*** consult with the Fish and Wildlife Service (or NMFS) when its actions might affect an endangered species. However, courts also grant substantial deference to an agency when the laws grant discretion to the agency. For example, the Forest Service must ***consider the*** relative values of the various resources, and must ***consider*** physical and economic factors in identifying lands not suited for timber production. For forest planning, the Forest Service should identify the legal requirements that must be

fulfilled, prior to considering alternative management direction for the national forests.

The second assumption underlying the perceived need for bomb-proofing is that various interests will sue if their desires are not met in forest planning. However, this assumption is inaccurate, in two respects. First, the Forest Service is facing relatively few lawsuits. In fiscal year 1989, only 11 of approximately 500 forest plan appeals and only 32 of 525,000 timber sales were litigated (300). (See ch. 5.) Second, and more importantly, people typically sue only if they believe the agency is being arbitrary or unfair. Such beliefs can generally be overcome through an open, honest exchange of desires and concerns among the agency and the various interested and affected individuals and groups, leading to understanding and acceptance of the possibilities and limitations for managing the national forests. This is the purpose behind NFMA's requirement for public participation in national forest planning.

Chapter 5

Public Involvement in Forest Planning

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Chapter 5
Public Involvement in Forest Planning

The National Forest Management Act of 1976 (NFMA) established a more direct and substantial role for the public in forest planning than had previously existed. Its public participation requirements complemented those already in place under the National Environmental Policy Act of 1969 (NEPA). Congress assumed that a more participatory planning process would lead to better, more acceptable management of the national forests, and that early and continual public involvement could help the agency resolve controversies in a more organized and timely fashion.

Despite NFMA, many conflicts and controversies over the management of the national forests remain. In October 1989, the Senate Committees on Agriculture, Nutrition, and Forestry and on Energy and Natural Resources convened a joint oversight hearing to review the planning process under NFMA. Several senators expressed frustration over the continuing controversies, and concern that many were being resolved outside of the planning process—in annual appropriations or in administrative appeals or litigation. In his introductory remarks, Senator Patrick Leahy (Vermont) stated:

> I have been very concerned with the process in which forest controversies in the Northwest are being resolved; not in the planning process; not in the courts, but through the appropriations process by means of limiting judicial review (143).

Senators Mark Hatfield (Oregon) and James McClure (Idaho) concluded that the planning process had ''broken down. ' Prescriptions for reforming the current system vary widely, but the problem is commonly attributed to Forest Service failure to involve the public effectively in forest planning.

The legal and regulatory framework for public participation in forest planning is designed to encourage public involvement in three general stages of the process: 1) in plan development, review, and implementation; 2) through requests for administrative review of plans and decisions; and 3) through judicial review. In addition, NFMA instructs the agency to coordinate its planning process with those of other Federal agencies and State, tribal, and local governments. Taken together, these charnels for public participation are intended to expand and elevate the public's historic role in Forest Service decisionmaking and to assure that public values, needs, and desires are reflected in forest plans.

This chapter will examine public involvement in forest planning at the stages referred to above. The first part examines public participation at the plan development and implementation stage. Specifically, it discusses the legal framework for public participation and Forest Service efforts to integrate the public in its decisionmaking. It also addresses why those efforts seem inadequate, and reviews alternative approaches to public involvement in Forest Service decisionmaking. The second part discusses the role that administrative appeals play in the planning process, and analyzes current issues and concerns surrounding the use of the appeals system. It also discusses the role of the judiciary in forest planning, and specifically addresses issues of judicial review. Finally, the third part of the chapter examines the additional requirements for coordinating Forest Service planning with other government activities.

PUBLIC PARTICIPATION IN FOREST SERVICE PLANNING

Legal Requirements

Forest Service land and resource planning and management is guided primarily by three laws: the Multiple-Use Sustained-Yield Act of 1960 (MUSYA), NEPA, and NFMA. (See ch. 4 for a more thorough discussion of the legal framework for Forest Service planning and management.) Taken together, these statutes provide both a conceptual basis and a firm legal mandate for public involvement in the forest planning process. Common among these laws is the implicit recognition that planning and managing public resources is not solely a function of technical expertise and scientific decisionmaking. It is inherently a subjective process, dominated by social, political, and cultural questions (49, 51, 330). (See also ch. 3.) The Forest Service must involve the interested publics in a meaningful way, if the resulting plans are to respond to changing public needs and values (3, 49, 51, 231, 330).

The Multiple-Use Sustained-Yield Act of 1960

The passage of MUSYA in 1960 and several Federal statutes in the 1970s significantly opened up administrative agency procedures to closer public scrutiny and more active public involvement. Under MUSYA, the Forest Service retained primary authority and significant discretion over the management of the forest resources. Nevertheless, by expanding the number of public resources over which the agency had express management and regulatory authority, the act provided a stronger conceptual basis for agency responsiveness to pluralistic, public values than had previously existed.

MUSYA directs that, in managing the national forests, the Forest Service shall give "due consideration . . . to the relative values of the various resources, and shall assure that resources are ''utilized in the combination that will best meet the needs of the American people. " As discussed in chapter 3, the act embraced the concept that the public's interest is best served by managing the national forests for many values. However, the act provided only the most general guidance to agency managers as to how to do this. (See ch. 4.)

MUSYA provided a theoretical framework for public participation by focusing agency attention on multiple resource management. This mandate placed the agency in a more visible position of weighing and balancing resource values and uses and of reconciling conflicts. And because planning and management decisions were supposed to be guided by the ''needs of the American people, ' MUSYA began a trend toward external, as opposed to bureaucratic, standards of accountability (231). However, it did not provide the general public with any legal right to participate in forest planning.

The National Environmental Policy Act of 1969

Throughout its history, the Forest Service had solicited public input into its decisionmaking processes, but often informally and infrequently (208). With the enactment of NEPA in 1970, the agency was expressly required to establish procedures for public involvement in planning and management.

Congress enacted NEPA at a time when the public was demanding more access to administrative decisionmaking. NEPA requires Federal agencies to assess the environmental effects of any proposed major Federal action that would significantly affect the human environment. NEPA emphasizes "full disclosure' of agency decisions—findings from environmental assessments and impact statements. An examination of alternatives to the proposed action, and comments from reviewing State and Federal agencies, must also be made available to the public.

NEPA does not provide standards and guidelines for public involvement, nor does it specify that public meetings must be convened. It treats the public principally as a recipient of information, rather than a participant in decisionmaking (231). Under the law as written, Federal agencies have a duty to make environmental impact statements available for review, but are not required to solicit feedback from the public.

Nonetheless, public awareness of potential environmental consequences of proposed programs or actions makes agencies more accountable to public concerns and more sensitive to the environment (231). President Richard Nixon made it clear that Federal agencies were to actively seek public views before making final decisions. His Executive order to implement NEPA directed agencies to:

> Develop procedures to ensure the fullest practicable provision of timely public information and understanding of Federal plans and programs with environmental impact *in order to obtain the views of interested parties. These* procedures shall include, whenever appropriate, provision for public hearings, and shall provide the public with relevant information, including information on alternative courses of action (183) (emphasis added).

President Nixon had instructed the Council on Environmental Quality (CEQ) to issue ***guidelines*** to Federal agencies for preparing Environmental Impact Statements rather than regulations. Regulations to implement NEPA were subsequently issued under President Carter in 1978. These regulations provide clearer guidance to agencies on the purpose of public involvement, and give the public a more participatory, consultative role than the vague "inform and educate' language of the law had done. The regulations provide that:

> Federal agencies shall to the fullest extent possible. . . [encourage and facilitate public involvement in decisions which affect the quality of the human environment (40 CFR 1500.2(d)).
>
> Agencies shall (40 CFR 1506.6):
>
> (a) Make diligent efforts to involve the public in preparing and implementing their NEPA procedures.

> (b) Provide public notice of NEPA-related hearings, public meetings, and the availability of environmental documents . . .
>
> (c) Hold or sponsor public hearings or public meetings whenever appropriate . . .
>
> (d) Solicit appropriate information from the public . . .
>
> (e) Explain . . . where interested persons can get information or status reports on environmental impact statements . . . and
>
> (f) Make environmental impact statements, the comments received, and any underlying documents available to the public . . .

under the regulations, agencies are thus responsible for *involving* the public in decisions affecting the human environment.

NEPA regulations also direct a process to facilitate decisionmaking, not to justify predetermined decisions. "NEPA procedures must insure that environmental information is available to public officials and citizens *before* decisions are made and ***before*** actions are taken" (40 CFR 1500. l(b)) (emphasis added). The regulations also require that agencies solicit public input early in planning and decisionmaking through '' scoping' '—' 'an early and open process for determining the scope of issues to be addressed and for identifying the significant issues related to a proposed action' (40 CFR 1501 .7). Furthermore, NEPA regulations direct agencies to ' 'integrate the NEPA process with other planning at the earliest possible time to insure that planning and decisions reflect environmental values, to avoid delays later in the process, and to head off potential conflicts" (40 CFR 1501.2).

While the regulations set forth clearer guidance to agencies on why to involve the public in planning and decisionmaking, standards for public participation in forest planning are evolving largely through case law. (See ch. 4.) Courts have provided some guidance as to NEPA's public participation requirements. In ***California v. Block,***[1] ***the*** court noted that: 1) the Forest Service was required to present a broad range of alternatives to allow full public participation in decisionmaking, and 2) information from the public was not only to be collected, but was also to be considered in decisionmaking (92). Nonetheless, two important questions regarding public participation in forest planning under NEPA remain largely unanswered:

1. What is the role of the public ***(vis-a-vis*** agency responsibility) in Forest Service decisionmaking?
2. How must the Forest Service demonstrate its response to public comments in its final forest plans and decisions?

The National Forest Management Act of 1976

With the passage of NFMA in 1976, Congress reinforced the public's right to participate in Forest Service planning and decisionmaking. Enactment of the law was largely triggered by the Monongahela decision[2] and other court decisions that threatened to halt certain timber harvesting practices in the national forests. (See ch. 3.) However, the controversy in the Monongahela National Forest of West Virginia was not unique, but rather an indication of widespread public dissatisfaction with Forest Service Management practices (80). Lawsuits were filed in Alaska, Texas, and several other States. Disputes about management of the Bitterroot National Forest in Montana led Congress to commission an independent evaluation of Forest Service practices (264).

The Monongahela and Bitterroot controversies involved not only the legitimacy of timber management practices under the 1897 Forest Service Organic Act, but also questioned the agency's interpretation of its multiple-use and sustained-yield mandates. The uproar over clearcutting was ''but the focal point for groups with a broad range of interests in reforming national forest management' (80). These conflicts demonstrated public perceptions of the agency as insensitive to nontimber values, and public demands for greater agency accountability in upholding its multiple-use mandate.

NFMA embraces the notion set forth in the NEPA regulations—that many conflicts can be reconciled by integrating the public into the decisionmaking process early and continuously. Upon submitting the conference report on NFMA to the Senate, Hubert Humphrey, the chief sponsor of the bill, characterized the public as ''advisers' to agency planners and decisionmakers:

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[1] *California* v. *Bergland,* 483 F. Supp. 465 (E. D. Cal. **1980),** *aff'd in part, rev'd in part, California* v. *Block,* 690 F.2d 753 (9th Cir. 1982).

[2] *West Virginia Division of the Izaak Walton League, Inc. v. Butz, 367* F. Supp. 422; 522 F. 2d 945 (4th Cir. 1975).

> This is an act that assures that our public forests are managed with advice from the several publics, and managed in a framework that makes ecological and environmental sense . . .
>
> It creates the policy machinery for making certain that professional expertise and public desires are brought together in the public interest (120).

President Gerald Ford echoed the Senator's remarks: "Emphasis throughout the act is on a balanced consideration of all resources in the land management process. Of equal importance, this act guarantees the full opportunity to participate in National Forest land and resource planning" (87).

NFMA directs the Secretary of Agriculture to promulgate regulations specifying procedures to ensure that forest plans are developed in accordance with NEPA, although such regulations have never been promulgated. The conference report on NFMA emphasized that the purpose of this provision was not to amend or mod@ NEPA, but to assure "uniform guidance . . . as to what constitutes a major Federal action for which an environmental impact statement is required" (266).

In addition, rather than just referring to NEPA for guidance on public participation, section 6(d) of NFMA specifically requires public participation 'in the development, review, and revision" of forest plans. This provision directs the Secretary at least to make the documents available at convenient locations and to "hold public meetings or comparable processes . . . that foster public participation in the review of such plans or revisions. ' Furthermore, Congress conferred an additional opportunity for the public to influence the regulations implementing NFMA in section 6(h), by providing for advice and counsel from an independent committee of scientists "to assure that an effective interdisciplinary approach is proposed and adopted. "

Finally, section 14 authorizes and encourages the use of advisory boards in planning and managing the national forests. Section 14(b) specifies:

> In providing for public participation in the planning for and management of the National Forest System, the Secretary. . . shall establish and consult such advisory boards as he deems necessary to secure full information and advice on the execution of his responsibilities. The membership of such boards shall be representative of a cross section of groups interested in the planning for and management of the National Forests System and the various types of use and enjoyment of the lands thereof.

Despite such direction, the Forest Service has not used any formally designated advisory boards for national forest planning or management since the late 1970s. In one case, the White Mountain National Forest in New Hampshire, an existing advisory board that was officially disbanded in the late 1970s has continued meeting without explicit Forest Service coordination and assistance as an Ad Hoc Advisory Committee. The Forest Service has stated that the requirement to conform with the Federal Advisory Committee Act (FACA) inhibits their use of advisory boards, but how and why FACA inhibits advisory board use has not been explained or demonstrated.

Taken together, these several sections of NFMA project the public as an integral component of forest planning and implementation. While the law preserves agency decisionmaking authority, it casts the public in the role of advisers and consultants to the planning and decisionmaking processes.

NFMA Regulations

In the fall of 1979, the Secretary of Agriculture promulgated regulations to govern the implementation of NFMA. These regulations provide substantial guidance on public participation, and furthered Congress' intent that public involvement should constitute more than a mere exchange of information. Section 219.7(a) sets forth the intent of public participation to:

> (1) ensure that the Forest Service understands the needs and concerns of the public;
>
> (2) inform the public of Forest Service land and resource planning activities;
>
> (3) provide the public with an understanding of Forest Service programs and proposed actions;
>
> (4) broaden the information base upon which land and resource management planning decisions are made; and
>
> (5) demonstrate that public issues and inputs are considered and evaluated in reaching planning decisions.

Section 219.7(e) provides further that "conclusions about [public] comments will be used to the extent practicable in decisions that are made. " This constitutes the first time that the agency was explicitly required to reflect public input in forest management plans and decisions.

The regulations provide reasonably clear guidance to agency managers on the purposes and objectives of public involvement, but also provide the agency with significant discretion in choosing the best methods for public participation. Section 219.7(c) states, "Public participation, ***as deemed appropriate by the responsible official, will*** be used early and often throughout the development, revision, and significant amendment of the plans (emphasis added). Nonetheless, the Forest Service must demonstrate that it has considered public input in reaching its final decisions. Thus, section 219.7(a)(5) was of special significance, because it forced action in response to public comments-the agency was specifically required to be "responsive" to public participation.

The NFMA regulations were significantly changed in 1982, as part of the sweeping changes recommended by President Ronald Reagan's Task Force on Regulatory Reform. The Task Force recommended that much of section 219.7 be eliminated or changed (269). Section 2 19.7(a) would have been reduced to a single, broad statement of purpose: ''public participation throughout the planning process is encouraged. " Because of strong public criticism, however, the Forest Service retained most of the original language (92). Nonetheless, the sections that most strongly required Forest Service responsiveness to the public—section 219.7(a)(5) to demonstrate consideration of public issues and inputs, and section 219.7(e) to use conclusions about public comments to the extent practicable-were deleted.

The Forest Service has defended the deletion, arguing that the sections were unnecessary, inaccurate, and nonregulatory, and thus inappropriate for NFMA regulations (92). However, several observers have criticized the Forest Service for eliminating those particular provisions which most clearly forced the agency to respond to public comment. These 1982 changes have significantly increased agency discretion of how to use public comments and have contributed to ''erosion of the role of the public as *participant in the* planning and decision process . . ." (emphasis in original) (231).

Forest Service Efforts in Public Participation

It is widely held—by Members of Congress, members of the general public, academicians, and many agency personnel-that the Forest Service has not efficiently or effectively used public input in its planning process (27, 91,231, 277,281, 330). This inefficiency is manifested, in part, by the rising number of appeals and lawsuits over forest plans and proposed activities. It is important to note that the issue surrounding public participation is not solely a question of whether the Forest Service has technically complied with the letter of the law, but also whether the agency has fulfilled the *spirit* and ***intent*** of the laws.

The Forest Service acknowledges that public participation is an important objective of its planning process, and provides numerous opportunities for the public to participate throughout the planning process. Nevertheless, the Forest Service has not demonstrated much success in achieving effective public participation; few forest plans show the degree to which public concerns have been accommodated or how managers have considered and responded to public issues and concerns. Some national forests have succeeded at involving the public in planning and decisionmaking, but for the most part, forest supervisors apparently lack sufficient training, guidance, and flexibility to respond adequately to public input.

Integrating the public into forest planning, implementation, and monitoring is admittedly difficult. The Forest Service is required to solicit public involvement in at least ten distinct points in the planning process (330). In addition, a large number of specific decisions affect the ''public interest, ' and this number has grown enormously since the passage of the MUSYA in 1960. Furthermore, agency leaders, observers, and participants differ on the public's role in planning and decisionmaking. NEPA and NFMA both contemplate that public concerns and issues will be reflected in the planning process, but neither specifies how and to what extent plans and decisions should accommodate these concerns. Because the Forest Service has not clearly defined the role of the public in the planning process, both agency managers and the public have different expectations and perceptions of the extent to which public input should influence final decisions.

Historical Development

Forest Service planning and management have been increasingly attacked since the 1960s. Because of the wide discretion of the Forest Service to make and implement forest policy, several interest groups felt that their views were systematically underrepre-

sented in plans and decisions (330). Though seldom faulting the professionalism of the agency's work force ***per se,*** some critics have charged that the agency simply has been inclined toward certain interests, while others have asserted that the agency was 'captured' by outside interests (202,250, 330).

The Bitterroot and Monongahela debates demonstrated the controversial and political nature of public land and resource management and highlighted the public's growing expectation for a greater role in Forest Service decisionmaking. The perceived lack of responsiveness to public needs and values led to calls for agency reform. In 1970, the Belle Report concluded in part that "the staff of the Bitterroot National Forest finds itself unable to change its course, to give anything but token recognition to related values, or to involve most of the local public in any way but as antagonists" and recommended agency reorganization so that public involvement would "naturally take place" (264). The 1971 Forest Service policy statement on public participation was not followed in practice (29). In 1972, Cutler recommended five reforms aimed at improving agency responsiveness to public concerns: 1) active recruitment of diverse professionals for a' 'multidisciplinary' staff; 2) early involvement of all interests in decisionmaking; 3) use of ' 'independent hearing officers and semi-independent citizens' committees' to review plans and decisions; 4) more and broader alternatives for public review and comment; and 5) adequate time to review alternatives (330)$_0$

Current Conditions **and Trends**

Criticism of Forest Service decisionmaking has hardly fallen on deaf ears. Since 1970, the agency has adopted scores of procedural reforms aimed at promoting public involvement in its policymaking processes. NEPA documents are widely distributed, public meetings are now commonplace, alternatives are routinely reviewed by interested publics, and the agency has used a growing number of citizen working groups to avoid plan appeals.

Despite Forest Service reforms, public dissatisfaction with final plans and decisions remains high, indicating that many still believe that the agency is unreceptive and unresponsive to their concerns and priorities. A recent survey of forest planning participants shows 43 percent were "somewhat to very dissatisfied" with the planning process in which they had participated, and 55 percent voiced frustration with the Forest Service planning process as a whole (68). In addition, 72 percent believed that the Forest Service unfairly favored some interests over others when preparing forest plans (68).

The Forest Service undertook its own internal review of the planning process under NFMA. Most of the employees surveyed indicated that the agency had technically complied with public participation requirements contained in the law and the regulations. However, the public was seen as dissatisfied with Forest Service attempts to involve them. Only 3 percent of the employees believed that public participation had affected final forest plans (279).

A 1990 report, which solicited comments and ideas about the forest planning process from a host of persons representing various interests, academia, State and local governments, and the general public, likewise reported a widely held feeling that Forest Service officials 'do not welcome proactive participation . . . but prefer to accept information only on their own terms and in forums organized by the Forest Service" (277). The participants felt that the agency's public hearings, arranged to invite views on issues, forced groups into taking hard, polarized positions at the outset. ''The planners then retreated to their offices, emerging sometime later with a draft, followed by another public hearing-and increased polarization" (277). The report attributed part of the problem to the lack of a clear agreement and understanding within the agency on the role of the public in reaching decisions (277).

While acknowledging shortcomings in public involvement, other observers maintain that the Forest Service has been relatively successful in promoting public participation, given the extensive and complex requirements of NEPA and NFMA. As the planning process continues to evolve and mature, public participation efforts will likely improve, assuming that agency leadership acknowledges the importance of public participation and actively encourages and is receptive to public input. In October 1989, Forest Service Chief Dale Robertson (207) stated, "In preparing these forest plans, we have worked with the public. We have come down on what we believe is the best balance after taking all the factors into account. " The 1990 internal critique of land management planning echoed the Chief's remarks:

> Great strides have been made in Forest Service planning. Citizens were involved to an unprece-

> dented extent. . . Many important relationships, with citizens, local officials, other agencies, and Indian tribes, have been formed . . . There was frustration, *but there is a general feeling that individuals inside and outside the agency did the very best they knew how* . . . [P]ublic participation methods changed as the planning process matured and as results indicated the need for changes. Such change will continue as we enter the next phase of forest planning (276) (emphasis in original).

Many questions concerning the legal adequacy of public involvement methods have been resolved through the administrative appeals process (155). According to the Forest Service, appeals have played an important role in "testing the soundness of the agency's day-to-day decisions, current policy and use of discretion. Thus, appeals can and do help refine and clarify Forest Service policies and procedures" (155). The agency's critique, which includes a series of recommendations designed to promote greater responsiveness to public input, is further evidence that the agency is learning from its experiences and attempting to improve public participation. This critique also prompted the agency to update its training course on plan development and implementation to ensure that needed changes are communicated to staff in the field.

Public participation probably will continue to improve as the agency becomes more experienced with the NEPA and NFMA processes. Nonetheless, there still appears to be a substantial gap between stated policy and the actual practice. Much of the criticism heard today echoes of that heard more than 20 years ago-that although the agency solicits public input, few participants perceive that their input has a noticeable impact on plans or decisions. The failure of Forest Service efforts to meet public expectations about being included in decisionmaking is common to Federal agencies (4). The promise of citizen participation in policy formulation and decisionmaking is seldom fulfilled, because for the most part, effective techniques of involvement and participation have not been widely adopted (231).

Reasons for Difficulties

Critics who charge that changes in the Forest Service's public involvement strategy and approach have been minimal, question the extent to which the agency has learned from past experiences (92, 230, 231, 330). The most common explanations for Forest Service difficulties in effectively involving the public in planning and decisionmaking are the use of incorrect models of public involvement, the lack of information on how to involve the public, professional resistance to public ideas, and inflexible conditions for managers.

incorrect Models--One explanation for why the Forest Service has failed to meet public expectations for participation is that the agency has not developed an appropriate model for encouraging and using public input. Likewise, the Forest Service managers have been unable to provide the public with a clear understanding of the purpose of their involvement or how their input would be used. "People did not know the level of specificity they were expected to make in their comments because they did not understand the decisions that were going to be made" (277).

Typically, the Forest Service convenes a meeting of various individuals and interests to discuss a set of issues determined by the Forest Service (277). This 'has led to issue-airing and venting, but has not affected decision-making" (277). By asking for interests and preferences, the agency encourages the public to act individually and separately (231). This approach suggests that the agency views the public narrowly, as a "gaggle of consumers," i.e. as individuals and groups with predetermined and static values and preferences (231).

This "model" of public participation is premised on the assumption that ***due process*** is the appropriate means to guarantee public access to agency planning and decisionmaking (231). The publics are given sufficient opportunities to present their views, and all views are considered, but the agency is the sole decisionmaker and final arbiter. The publics are thus placed in the position of having to advocate the "rightness" of their position and the "wrongness" of the positions of others (330).

This divisiveness promotes adversarial behavior and inhibits the ability of affected groups and individuals to find mutually acceptable alternatives (330). Citizens have no collaborative forum in which to learn about one another, to revise their opinions, or to discover common interests and mutually beneficial solutions (23 1, 330). Rather than promoting a dialogue among the agency and the publics, current models and approaches reduce the purpose of public input to mere information gathering; communication typically flows only one way—from the public to the agency (92, 231, 277, 330). The

process neither convinces nor informs the public, because it "does not provide the opportunity for mutual inquiry to better understand the issues involved and the merit of a variety of different alternatives; . . . affected groups are not given the opportunity to amend, support, or reject their early notions' (330). Thus, many are not convinced that final decisions are the most acceptable ones that could have been reached.

The adversarial model of public participation also promotes distrust of the agency, because those who disagree with the decisions tend to view agency managers as the agents of the opposing interests (330). Furthermore, the public strongly perceives that forest planning has been used to justify predetermined decisions (277). Decisions disappoint many participants, because they have not been convinced by the decisionmaking process "that the decision reached is right' (330). Participants 'wanted a clear and credible rationale for the decision that showed that their comments had been heard, understood and considered, and evidence that the Forest Service had acted on the best information available" (277). All too often this rationale has not been forthcoming in final plans and written decisions.

For want of a clear understanding of the role of the public, managers tend to measure the adequacy of public involvement practices in terms of simple process or interest representation (231)--how many public hearings were held; how many different interest groups were present at these meetings; how many comments were collected; etc. Because agency officials lack explicit formulas for decisionmaking, they seek to compensate by being "systematic and thorough" in their approach to public involvement (330). This ensures that virtually every affected or interested group and individual has an opportunity to present their views, but provides no guidance to managers on how to integrate the public into the process of weighing alternatives, evaluating tradeoffs, and making final decisions. This approach fails to distinguish between ''interest airing' and ''interest accommodation ''-concepts with significantly different implications (330). The current Forest Service approach tends to be based on interest airing alone, and is not designed "to accommodate [the publics'] concerns ***in a way that satisfies them that they have indeed been accommodated as well as possible" (330).*** "Issue airing," without involvement in the decisionmaking, encourages participants to argue positions rather than to discuss the larger interests and issues at stake (83).

Insufficient Data—Some observers attribute the agency's failure to engage the public in the planning process to the lack of data available on the most effective and efficient public participation techniques and methods. "Little empirical research is available to help forest managers understand public participation . . . [and] empirical data in social science literature that analyze the most appropriate methods to involve the public in resource decisionmaking are scarce' (86). A survey of forest planning participants in Idaho and Washington identified five participation methods preferred by the public: 1) citizen representatives on Forest Service policymaking bodies, 2) formal public hearings, 3) surveys of citizen attitudes and opinions, 4) open public meetings, and 5) meetings held for residents of specific communities (325). However, none of these five methods were used by any of the national forests in the survey area (325). Arguably, information on public preferences could assist managers in stimulating better local public participation.

The Forest Service also lacks empirical evidence on the people who tend to participate in forest planning (86). No research has identified or examined demographic, sociological, or other characteristics of the people who participate. It is difficult to design effective involvement programs without understanding the characteristics and interests of the participants. ''Empirically derived information can help forest managers understand the public more accurately and can help participation officers design programs for the population in general and for specific groups" (86).

Resistance to Public Involvement—The mandate for more extensive public participation in the forest planning process was imposed upon an agency that had traditionally operated relatively autonomously. While agency leaders were receptive to the charge for greater public involvement, both NEPA and NFMA required major changes in the reamer in which the agency operated. Field managers were not experienced or trained in integrating the public into the decisionmaking process, and little guidance was provided on how and why to accommodate the public; consequently, public participation methods have evolved slowly.

Numerous critics assert that the agency leadership does not welcome proactive participation, because it

can be counterproductive-sometimes the public wants decisions that are inappropriate, infeasible, or inconsistent with agency policies (92, 159,229,231, 277). Forest supervisors often believe that 'proper' decisions must be internally consistent ("loyalty to the party line' '); responding to local interests is thus irresponsible, unless the decision is unequivocally faithful to agency policies and decisions (229, 231). Consequently, the agency has preferred to accept public input only on its terms and in forums it has organized (277).

Another allegation is that the Forest Service resists meaningful public participation to preserve its decisionmaking autonomy and discretion. Being responsive to the public may restrict certain agency activities or options. Forest Service employees have been described as *reluctant public servants,* who "still seem to regard their work as the strict application of natural science to the management and protection of the environment' (159). Professional resource managers believe that their training and experience equips them to make decisions and that, by and large, the public is uninformed and too diversely opinionated for useful input and sound decisionmaking (227).

Natural resource personnel surveyed from several agencies felt that the public, even the interest groups, had little knowledge of land and resource management issues (237). Thus, managers work to ' 'educate' the public and change people's minds about the agency policies and practices rather than explore alternatives to satisfy the public's goals and objectives. "Information programs are undertaken more from a desire to shape public opinion than to incorporate public opinion into policy decisions' (159). The Forest Service typically develops and defines public issues internally and then invites the public to review and comment (77). This approach perpetuates the notion that public participation is nothing more than a forum in which to ''inform and educate' the public.

This attitude impedes listening to the public. The Forest Service employs many professionals, with diverse backgrounds. However, resource expertise is also employed by State agencies, by other Federal agencies, by universities and consultants, and by many interest groups. Even the uninformed can have intelligent ideas about land and resource management. Sometimes the most innovative suggestions come from those whose thinking has not been narrowed by professional training. Furthermore, education is most likely to occur, not when the public is told what is feasible, but when it is guided to reach its own conclusions. Finally, professionals often do not realize that their technical decisions may intrude on public values, and only public participation can define which decisions are technical and which are public (3).

The emphasis on retaining autonomy and discretion has prevented the agency from using effective models of participation in forest planning and from resolving basic issues such as the identity of the publics, the roles of the agency and the public in the planning process, and the degree of influence the public should exercise over final decisions (231). The unwillingness to allow the public to play a greater role in planning and decisionmaking has stifled the agency's capacity to learn-to carefully evaluate and reflect on past programs and policy commitments, to examine a wider range of alternatives to proposed actions, and to respond to changing public values and priorities (203, 231).

Inflexible Conditions—The 1970 Belle Report found that Forest Service managers in the field lacked the flexibility needed to respond effectively to public needs:

> In order to maximize local community support those persons in the Forest Service most intimately associated with local community interests [i.e., the district rangers] must be free to act . . . yet his [sic] authority is severely limited and all too frequently his decisions and answers are bureaucratically determined . . , He is therefore denied the flexibility to meet issues and problems on an ad hoc basis. It might also be said that his decisions are always predetermined, at least with respect to major issues and problems (244).

Furthermore, the Forest Service does not reward managers or other employees for accommodating the public:

> Unless there is freedom to solve resource related problems on a situational basis, there are no grounds for public participation . . .[but] public participation is the key in determining the particular expression of public interest to particular problems (29).

Evidence suggests that the inflexibility described in the Belle Report 20 years ago remains. Forest supervisors and district rangers are often constrained from responding to public issues by a host of factors beyond their control. For example, allocated na-

tional goals and objectives, set in the RPA Program and through annual budgets, frequently contradict those derived at the local level, effectively preempting forest plans. Control systems-rewards, incentives, and budgets—are not linked to the plans. Local forums designed to encourage deliberation and debate among the most interested publics are for naught, if they are systematically overruled by national policies that are insensitive to local concerns.

Even agency employees note that local planning and response to local publics are being overridden. In an open letter to the Forest Service Chief, forest supervisors from the Rocky Mountain areas stated:

> The emphasis of National Forest programs does not reflect the land stewardship values embodied in forest plans, nor does it reflect the values of many Forest Service employees and the public. , . Program/ budget testimony is constrained by Administration objectives. Program shifts contained in forest plans and public opinion are not expressed . . . in annual budgets and agency policies (90).

In their recent recommendations to the Chief, these forest supervisors echoed the conclusions of the Belle Report:

> Field line officers should become more effective in working with local, State and National key publics and elected leaders to build support for Forest Service programs generally, and to discourage specific earmarking (90).

Finally, the functional organization of the Forest Service employees and resource-oriented budgets impair a manager's ability to implement integrated resource plans. Many interests and employees believe that functionalism has led to funding for some resources and not for others (276, 277). It is argued that the differences between funding called for in the plans and actual appropriations prevent the agency from meeting the intent of NFMA, because the truly interdisciplinary and integrated plans cannot be implemented as planned (149).

Reducing Conflict Through Cooperation and Collaboration

The preceding discussion of problems in involving the public is not to suggest that agency efforts at public participation have been a total failure on every national forest. Despite the lack of agreed-upon criteria to evaluate the success or effectiveness of public involvement, observers cite a number of forests that have achieved "viable plans" (330). Typically, these forests brought diverse groups together to identify issues and discuss alternatives; these informal citizen working groups and forums encouraged debate, dialogue, and deliberation among the groups and with the agency. According to several observers, success largely depended on the initiative of particular forest supervisors (or in some cases regional foresters), rather than on guidance from agency leadership (229, 231).

> Typically, where a forest plan was deemed a success, there was a forest supervisor who understood the social and political environment, was able to read the forest constituency well, and personally navigated the plan through the reefs of public controversy (277).

Other forests seem to have committed themselves to meaningful participation in their final forest plans. For example, in the Ochoco National Forest:

> Incorporation of public involvement into decisions being reached in the final Forest and Grasslands Plans has been an integral step in progressing from the draft documents . . . Significant steps were taken during the last four months of final document preparation to insure that direction in the final plans responded accurately to comments received on the draft. In response to public comment, new information and legislation, significant changes were made in the preferred alternative between Draft and Final. Concurrently, with the alternative modification, the Forest Service worked closely with the public in attempting to validate and/or seek 'consent' for the Final Plan (274).

Although this statement alone does not prove that public participation was effective on the Ochoco, it does indicate that the agency recognizes the importance of public participation in the planning process, and acknowledges that public input should be reflected in final plans and decisions.

These successes and commitments are a valuable beginning to effective involvement of the public in forest planning and decisionmaking. However, if public participation in forest planning is to fulfill the purposes of NEPA and NFMA, the Forest Service must provide consistent and organized direction for improving public participation. Effective participation is not solely a function of process and procedures; managers must have a clear idea of why the public is being consulted for particular decisions, and ***how they*** should consider and respond to public input.

Why Involve the Public in Forest Planning

The decisionmaking responsibilities of Federal administrative agencies, including the Forest Service, contain duties best described as ''quasi-legislative' in nature. This is true whenever Congress vests substantial discretion in an agency to execute broad or general legislation, such as MUSYA. Reich (203) noted the 'practical necessity' of broad administrative discretion, due to the growth in the administrative state in the last 50 to 60 years. However, broad grants of administrative discretion can also be inconsistent with a ''pluralist vision of society, because broad discretion creates "the possibility that unelected bureaucrats could impose their own ideas on the public" (203). Concern over the legitimate role of the public administrator led to the creation of the *administrative process;* "Administrators, in theory, became managers of neutral processes designed to discover optimal public policies" (203).

Agency planning activities have been characterized as falling somewhere between rulemaking and adjudication. Planning activities prior to NFMA, however, were generally considered exempt from the requirements to involve the public under the Administrative Procedures Act (APA) (208), and NFMA did not directly alter this situation. The Forest Service's broad mandate in MUSYA necessarily requires agency managers to allocate scarce public resources, and NFMA preserves broad agency discretion in planning. Thus, the concerns about representation and agency accountability to the public have grown steadily. For example, the Bitterroot and Monongahela controversies erupted, in part, because some members of the public believed that Forest Service policies were unresponsive to and inconsistent with public demands. Increasingly over the past two decades, the public has demanded and expected the right to participate in Forest Service planning and decisionmaking.

Given the nature of Forest Service responsibilities —allocating scarce public resources through long-range, integrated resource planning and management—the call for greater public representation and involvement in agency decisions seems perfectly logical (202). While a strictly democratic approach to agency decisionmaking might be too cumbersome and costly, only public participation can assure that the allocation of forest resources ***best*** satisfies the ' 'public's interest.' In 1962, Reich wrote:

> . . . [it] can be argued that in a democracy the 'public interest" has no objective meaning except insofar as the people have defined it; the question cannot be what is "best" for the people, but what the people, adequately informed, decide they want.

Failure to involve interested publics in planning can lead those publics to choose other forums-such as Congress and the courts-to press their demands, and may result in final plans that cannot be implemented (49, 203, 231).

Affected and interested individuals and groups can contribute to agency decisionmaking processes in several ways. Public involvement is most commonly viewed as a means to provide agencies with greater insight into values, needs, and priorities than would be available without such input. Perhaps more importantly, however, public participation can serve to define the important decisions and relevant information for decisionmaking (92). Public involvement can lead agency managers to consider a wider range of issues and to articulate concerns more clearly (92, 203, 330).

Public participation can also serve as an "early distant warning system, " alerting agency planners and managers to resource issues that are likely to cause significant controversy in the future. With more direct insight into public values and priorities, the agency can develop plans that address new and emerging concerns and, in theory, avoid making decisions that prompt appeals and litigation and that delay implementation (49, 306). If used effectively, public input can help agency managers detect and address problems early, thereby leading to more efficient and expeditious implementation of the plans on the ground.

Finally, public participation can also improve agency accountability. Several observers argue that public involvement is needed as a representative check on agency activities (92, 203):

> Administrative agencies . . . have been making decisions in a temporary political vacuum. Thus, in a sense, the present day participatory emphasis represents a restoration of the political balance in our democracy-a balance that was temporarily lost because the complexity of problems developed faster than the institutional capacity to deal with them through representative procedure (186).

Including the public in the decisionmaking processes helps to ensure that agencies accurately determin e the ''public interest' in a given situation

and respond appropriately; public participation can help to bridge the gap between actual public values and those perceived by the agency.

The Forest Service has a distinguished history of managing the public forests and rangelands. The agency's professionals have traditionally been educated in a variety of professional and scientific disciplines and have historically maintained virtually exclusive decisionmakingauthority over the allocation and management of national forest resources (202, 208, 324). However, as noted in chapter 3, conflicts over resource use have intensified since the 1950s and the agency's statutory mandate has been broadened to include express consideration of more noncommodity values. Consequently, the number of subjective, value-laden questions confronting managers has increased significantly, limiting the ability of professionals to determine and represent the "public interest" (202, 330).

> "Goodness" and "badness" in our society are collective value judgments, and land expertise is no better qualification than many others for making them (15).

While education, training, and open-mindedness are important characteristics of land and resource professionals, these characteristics do not give managers any special ability or authority to represent the values of others (15, 202, 330). To the extent interested members of the public are allowed to represent their own concerns and values, public participation can inform and guide final plans and decisions (330).

This is not to suggest that all battles over forest management can be avoided by involving the public in planning and decisionmaking; mutually satisfactory decisions simply cannot be reached on some issues (203, 330). Also, the agency should not be relieved of management authority and responsibility.

> [T]he issue is not whether the public or experts are to manage, but whether, and to what degree, the experts should be made aware of, and responsive to, public opinion (202).

Forest Service managers are, ultimately, responsible for making decisions. Nonetheless, public involvement can help managers: 1) determine important public values and priorities, 2) define critical issues and the relevant information to address them, 3) identify emerging issues and possibly avoid crises, and 4) assess how well they have fulfilled the "public interest."

Models of Effectiveness

Administrative procedures developed to promote public participation are frequently flawed, because public wants are often assumed to be predetermined and static. The primary purpose of public participation, therefore, is presumed to be gathering from the public.

> People's preferences are assumed to exist apart from any process designed to discover and respond to them, that is, outside any social or political experience in defining the nature of the problem and attempting to resolve it. . . Individual preferences do not arise outside and apart from their social context, but are influenced by both the process and the substance of public policy making (203).

Public participation in Forest Service decisionmaking is valuable, not just because it offers interested groups and individuals a forum for conveying and advocating certain positions, but because it provides individuals and groups the opportunity to understand the values and preferences of others and a chance to refine their own.

Five distinct concepts of the public, each portraying the public in a different capacity, have been described (239). One concept is the public as market ***players-as*** individuals and their individual preferences. Another is the public as ***clients—as*** organized interests that "lobby" decisionmakers. The third concept is the public as ***patients—as*** persons or groups who are affected by policies and decisions. The public can also be viewed as ***consumers-as*** persons interested in using goods and services (in contrast to simply expressing their preferences). Finally, the public can be viewed ***as functionaries—*** as the interests of producers (owners and laborers) in making and selling resource-based goods and services.

Distinguishing among these concepts can be instructive to administrators considering how to involve the public in planning, but there are two limitations to this approach. First, various individuals and groups may fit within different concepts at different times-acting, for example, as a client on one day or in one setting, and as a consumer on another day or in another setting. In addition, all of these concepts divide individuals from one another;

none include the ***political identity*** of the public as a whole-the public as ***citizens (239).*** Nonetheless, viewing the public with these distinct concepts, portraying the public in various roles, can help decisionmakers understand the interests and motivation of the individuals and groups who participate in forest planning.

Forest Service administrators commonly use a "market imagery' model of the public (141). The public is typically viewed narrowly, as individual competing and conflicting interests, as ''a gaggle of consumers shopping for policies from shelves stocked by government experts" (141). Thus, public participation emphasizes: 1) the need to "inform and educate" the public about agency programs and activities, and 2) the collection of opinions from a wide variety of interests, to be sure all views are represented. Those opinions are then weighed against resource management concepts, costs, and legal constraints, with agency decisionmakers choosing alternatives they believe best meet the expressed interests (49, 203, 330). Such an approach is generally insufficient because it emphasizes ' 'representation' rather than ' 'accommodation' of multiple interests (49, 330). The incomplete or inaccurate picture of the publics, which can result from relying principally on the market imagery model, may lead agency planners to miscalculate the political feasibility of final plans and decisions.

A broader view of the public, on the other hand, can encourage mutual understanding. Public involvement in planning and decisionmaking not only offers a forum for conveying concerns and advocating positions, but also provides an opportunity to understand the values and preferences of others and a chance to build on common bonds. Open discussions and joint fact-finding can also improve understanding of the issues and conflicts underlying decisions, and thus produce insights into how and why specific decisions are made (330). Understanding is essential to building trust among the participants (the public and the agency employees). Effective public involvement can, therefore, encourage trust, and thus acceptance of the final plans and decisions (49, 203, 330). An appreciation of the significance of effective public involvement in developing implementable plans can lead agency managers to develop effective procedures to involve the public.

Open Decisionmaking or Decision Building—An ongoing interchange among diverse interests and the agency is needed to reflect informed public opinion and/or consent in the goals and objectives for land and resource management (306). Planning and decisionmaking is a learning process, and models of participation should, therefore, encourage two-way communication, which allows the agency and the general public to learn from each other (203, 231). The agency and the public should each be viewed as contributors to the process, with different responsibilities.

Problems in public management of natural resources and environmental quality necessarily involve technical, biophysical questions-e.g., what is feasible, what results from specific practices, what various practices cost. They also involve human, socioeconomic questions, as well—e.g., what should be the goals, what values are important, what practices are acceptable (29, 306). The latter are questions of value, and ''only ***the public*** is able to provide adequate insights into the social or human aspects' (29) (emphasis in original). Professionals have no special training for determining what is socially desirable (15). One major objective and challenge of the planning process is to balance ''traditional democratic notions of citizen involvement in government with the countervailing need for technical competency and efficiency of the technocratic society" (92, 306). Thus, on those issues involving inherently value-laden questions, more politically acceptable decisions could be made through a more collective, collaborative decisionmaking process.

Public participation can lead to more collective planning and decisionmaking, if conducted in a manner that encourages dialogue or deliberation among the agency and interested individuals and groups (203, 231, 330). Public deliberation over public issues is the "foundation of democracy" (203).

> Such deliberation can lead individuals to revise opinions (about both facts and values), alter premises, and discover common interests. Disagreements and inconsistencies encourage individuals to balance and rank their wants. The discovery that solely personal concerns are shared empowers people to act upon them (203).

Furthermore, socioeconomic considerations enter each stage of the decision process (3, 330). Thus,

public involvement should aim for sustained interaction among the agency and the interested publics throughout planning and implementation (29, 306).

More collective decisionmaking that welcomes public views and considers them seriously is "open decisionmaking" (228, 277). It encompasses many of the concepts described above--sustained interaction among the agency and public interests, honest sharing of information and opinions, and clear description of how decisions were reached. Thus, open decisionmaking effectively leads to the "public dialogue" that is the essence of collaborative decisionmaking.

Shannon (231) suggests that the Forest Service replace the vision of "decisionmaking' with "decision building. " The sole decisionmaker is replaced with a leader who helps the agency and the public jointly build acceptable decisions. Thus, the manager becomes responsible for organizing people (employees and the publics) and information, to develop the knowledge and commitment necessary to choose a course of action (52). This model of decision building recognizes that decisions require considerable effort by all interests, and that the process must be coordinated so that the "pieces fit together" (231).

Clearly, decision building, open decisionmaking, or collaborative planning would require a change in Forest Service planning and decisionmaking.[3] Greater public involvement in planning and decisionmaking likely will impose greater duties and responsibilities on the managers, many of whom are already stretched to their capacity to perform their required duties. However, if people are involved-if they help build the decisions and understand why decisions are made-they will not only be more likely to accept the decision, they will also contribute to its implementation. If the agency is to get out of the courts, public participation must effectively ***involve the*** public.

Manager Responsibilities-A change ***from*** decisionmaker to decision builder does not eliminate managers' responsibility for their decisions. However, the focus of efforts is altered. Rather than functioning as an arbiter, managers would function more like brokers. They would solicit, organize, and facilitate public participation and debate and seeking mutually beneficial tradeoffs and compromises through discussions with and negotiated settlements among the various interests (49). Discussions of interests, as opposed to declarations of positions, lend a less adversarial and more collaborative atmosphere to the planning process (83, 330). Thus, an administrator would ''fimction less like . . . [a] 'neutral' manager . . . [and more like a] teacher and guide" (203).

> The professional has the responsibility to provide the public with the basic information required to understand problems and to recognize what is involved in the decisions that are made. Once the public has set ***its goals, the*** professional can help by applying technical skills in the attainment of those goals (29).

Agency managers can also advise on the physical, technical, and practical feasibility of whether the expectations and goals can be achieved. Managers thus lead in the debate, as well as provide technical expertise (49).

Managers reevaluating the public's role in decisionmakingmust ask three initial questions (216): 1) who should be involved in the decision process, 2) what role should they play, and 3) what degree of influence should they possess. By addressing these questions, the agency can provide its managers with direction on the purposes and objectives of public involvement, and the public with a clearer indication of how its input will be used in making final decisions. This, in turn, would provide the public with a greater incentive to become involved.

A modified organizational structure may be required to involve the public effectively. The resource-oriented structure may inhibit the open, wide-ranging discussions inherent in open decisionmaking. Furthermore, periodic reevaluation to determine whether the current structure supports successful planning and implementation is fundamental to effective strategic planning (70, 101). Thus, reexamining the roles of agency managers and the public in the decisionmaking process might prompt the agency to revise its internal structure and adopt new techniques that better promote public involvement.

Once administrators determine when and why to involve the public, they should focus on effectively promoting public participation. This requires more

Throughout the remainder of this chapter, the term decisionmaking is used generically to refer to making decisions, whether by open, collaborative, decision building or by more traditional processes.

than providing ample notice of decisions to potentially interested individuals and groups. Incentives to participate in a particular forum are also needed (231). Forest policy is made in a variety of forums—in Congress, in the Forest Service planning and appeals processes, and in the court--each open to various degrees of public involvement. Understandably, persons and groups will be more inclined to participate in the forums where they believe that their participation will have the greatest impact (80, 230).

Finding the right formula for facilitating public participation is admittedly difficult. The suitability of methods and procedures varies with the nature of the decisions, the geographical setting, and the preferences of the local publics. For example, a town meeting might work well for public involvement in parts of New England, where town meetings have a rich history, but might not work at all in other parts of the country; similarly, some individuals are uncomfortable participating in public hearings, preferring letters or personal interaction. Whatever procedures are chosen, managers should encourage the public to participate by responding clearly to their concerns, and stimulate deliberation and debate. Without incentives to participate in agency planning and decisionmaking processes, citizens and interest groups often seek out other forums, such as Congress or the courts, to influence forest policy and decisionmaking (203, 231, 330).

Forest Service Efforts To Improve Public Participation--The Forest Service has recognized the importance of public participation in national forest planning and management. The agency recently reviewed its public participation practices (among other things), and the review team made a series of recommendations to improve the effectiveness of public participation (277). They emphasized the importance of achieving consensus among interested publics and the need to train agency personnel in communication, mediation, and facilitation skills. They also noted that the traditional resource-oriented approach to funding is inhibiting integrated planning and management (276).

Pursuant to this review, the Forest Service has begun the process of revising its regulations to guide the implementation and revision of forest plans (287), and has revised its forest plan implementation training course. In the proposed revisions of the regulations, the agency has embraced the findings and recommendations of the review and has announced its commitment to strengthen the role of public participation in agency planning and decisionmaking. Public participation processes are recognized as attempting to achieve "informed consent' among the interested publics, and the proposal thus casts the public in a more specific, direct, and active role in planning and decisionmaking. In addition, the proposed regulations encourage the practice of "conflict resolution" as a tool for public involvement. (See box 5-A.) This suggests that more collaborative public participation activities may become more commonplace.

Furthermore, observers have cited several national forests where public participation efforts are considered relatively successful, and suggest that their experiences can serve as models for other forests (149, 330). Wondolleck (330) cites seven national forests where managers have successfully established collaborative public participation processes to develop final forest plans or to avoid administrative appeals of those plans. Shands (228) described open decisionmaking as applied in North Carolina. Thus, the Forest Service has success stories to show that public involvement in national forest planning and decisionmaking can work.

Measuring the Effectiveness of Public Involvement in Forest Planning

Developing criteria by which to measure the effectiveness of public involvement is important for at least two reasons. First, measures of effectiveness can provide clearer direction to managers in the field on the goals and objectives of public involvement and on the role of the public in planning and decisions. With a clearer picture of the goals and objectives of public participation, managers could have abetter idea of how to respond to public input. Second, public participants would have clearer **and** more realistic expectations of how their input would be used, providing an incentive to participate in planning and in building decisions.

Because of the intensely political nature of forest planning, measuring the effectiveness of public participation activities in forest planning and decisionmaking can be elusive (203). Neither NEPA nor NFMA contain measures by which to gauge the effectiveness of public participation efforts. There are no substantive guidelines for how the agency should consider and respond to public input. In addition, courts are generally deferential to agency

Box 5-A--Opportunities and Limitations With Alternative Dispute Resolution

Involving the public in a collaborative manner can lead to plans and decisions that are accepted **by the public, but not all conflicts can be resolved, even through the best collaboration or open decisionmaking. Often, the individuals or groups who are dissatisfied with the plans or decisions will turn to administrative appeals or litigation to modify those plans or decisions. Sometimes, such disputes can be resolved through a number of techniques, collectively known as alternative dispute resolution (ADR).**[1]

ADR is a voluntary process involving some form of consensus building, joint problemsolving, and/or negotiation aimed at producing mutually acceptable solutions to disputes or controversies (21, 171). ADR encompasses several different types of problemsolving practices, the most common of which are negotiation, mediation, and arbitration (21, 171). Negotiation brings the parties together to bargain, compromise, or otherwise solve problems and settle disputes. Mediation involves a neutral third-party mediator or facilitator to assist the parties in resolving their differences, but the mediator has no authority to impose a settlement. Arbitration is similar to mediation, but the third-party arbitrator does have the authority to impose a settlement A fourth type of ADR, similar in many respects to mediation, is termed joint problemsolving. This technique brings interested parties together (possibly with a neutral facilitator) to collaboratively solve problems, typically related to proposed rules, plans, or actions, and thus is especially useful in administrative rulemaking and in planning (37, 231).

The Use and Benefits of ADR

The use of ADR by State and Federal agencies is becoming more **common. ADR has been used successfully to resolve** disputes involving a wide variety of environmental and natural resource issues, **such as land use, water resources, air quality, energy, forest land and resource planning and management, and toxics (21). Negotiated rulemaking and Superfund mediation by the U.S. Environmental Protection Agency (EPA) are perhaps the best known examples of the use of ADR by a Federal agency (21, 203, 204), and legal challenges to EPA rules have declined considerably since they began negotiated rulemaking (300). In addition, the Administrative Conference of the United States has encouraged the use of ADR in Federal rulemaking to reduce subsequent litigation (21).**

The Forest Service is encouraging the use of ADR, especially mediation, for developing final forest plans and for resolving administrative appeals of plan and projects. The 1989 revision of the administrative appeal regulations encourages the use of ADR to settle appeals (36 CFR 217.12(a)), and the proposed revision of the forest planning regulations encourage conflict resolution at all stages in the forest planning process *(287).* **Furthermore, Chief Robertson has publicly endorsed and encouraged the use of ADR by the national forests (1 16).**

The Forest Service has responded to such encouragement. Bingham and DeLong (22) identified 21 national forests that had relied on ADR techniques to develop final plans or to resolve administrative appeals. Wondolleck (330) cites seven national forests where agency managers established collaborative public participation processes to develop final forest plans or to avoid administrative appeals of those plans. For example, the draft forest plan for the Monongahela National Forest in West Virginia received widespread public criticism. In anticipation of administrative and legal challenges, agency planners invited interested groups and individuals to work closely with them to redevelop plan alternatives; the result was a final plan that was substantially different than the draft plan (330). On the other six national forests-the Jefferson, the Cibola, the Chugach, the Rio Grande, the Chattahoochee/Oconee, and the Nebraska--agency managers also used ADR techniques to resolve contentious administrative appeals.

Negotiation at the planning and appeals stages can be a valuable tool for bringing diverse interests together to resolve complex disputes (21, 22, 243, 330). Bingham and DeLong (22) noted that the use of ADR techniques in forest planning can:

1. **promote better communication;**
2. **promote more creative solutions;**
3. **promote more lasting decisions;**
4. **reduce the time to complete a plan; and**
5. **be used in combination with other processes.**

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[1] Some of these techniques are also useful in decision building. This discussion, however, focuses on techniques used to resolve administrative appeals and litigation after plans have been completed or decisions made.

The **promise of** ADR in forest plan development is that voluntary negotiated agreements can reduce the likelihood of administrative or legal challenges and increase the ability of the agency to implement the plans (22, 330). Past approaches to public participation have involved the public reactively-agency managers are unable to accommodate all interests, and then must defend their plans and decisions from administrative and legal challenges by dissatisfied interests (330). A more cooperative and interactive process for plan development and implementation can engage the publics proactively--managers invite forest users and other interested groups and individuals to jointly develop a plan that is acceptable to all (330). A mediator or facilitator can coordinate the process and help parties to develop final decisions that are more defensible (and less likely to need defense) than those made without direct public consultation and collaboration (330). The **neutral third party is particularly useful when trust among the participants is low. The principle underlying ADR can serve as a foundation for building these proactive and collaborative processes (21, 22, 330).**

ADR is an additional problemsolving tool, not a substitute for more traditional processes such as litigation (5, 21, 330). ADR may not always be appropriate for the dispute or acceptable to all the parties involved. But when traditional methods are unsatisfactory, ADR is an effective alternative means by which to avoid stalemate, polarization, or protracted litigation (21, 204). In some instances, ADR is less expensive and time-consuming than more traditional mechanisms, although research has not fully documented the savings (21). Nonetheless, ADR has provided parties with a greater feeling of control over the decisions being made and a greater sense of satisfaction, and has led to consideration of a wider range of alternatives and more creative options (84). Participants generally believe that ADR increases their input to planning and decisionmaking, and believe that it is fair and efficient (21).

Using ADR in Forest Planning

To date, the choice of whether to use ADR in forest planning has generally been made regionally or locally, on a case-by-case basis (21). The use of ADR techniques is clearly authorized, but not mandated. Because ADR can resolve many disputes over national forest planning and management, Congress and the Forest Service have considered how to institutionalize ADR in forest planning, but no specific requirements have been enacted.

Clearer direction and better-defined procedures for Forest Service use of ADR could create incentives to use ADR by providing greater predictability on how public participation might affect final decisions, and might encourage the participants to initiate negotiations themselves (22). Clearer direction on the use of ADR could also benefit managers by providing clearer standards and guidelines on when and how to use ADR, whether to engage a mediator, and how to convene all the necessary parties. By building a certain measure of consistency in ADR procedures, such standards and guidelines might reduce the likelihood that the process will be misused. Clearer direction might also make enforcement of negotiated agreements easier *(21).*

Proponents of institutionalizing ADR stress that the objectives should be to: 1) achieve some consistency in procedures, and 2) preserve the flexibility of the agency and the parties to shape the process to meet the needs of the particular circumstances (21, 22, 330). Achieving both objectives is admittedly a difficult task. Several suggestions for institutionalizing ADR have been proposed (22):

1. **The negotiation process should be voluntary. The strength of ADR lies in the parties' willingness to work cooperatively to find mutually acceptable solutions to common problems (21, 22, 330). Mandating the use of ADR would inhibit the necessary cooperation.**
2. **ADR is particularly useful for resolving specific disputes. The process has worked well on administrative appeals, because the interested parties are easily identifiable and the issues tend to be narrow and well-defined (22, 330). And, parties have an incentive to negotiate when a lawsuit is filed, because litigation is the final forum in which to affect the decision (22). Nonetheless, by negotiating early in the planning process, the Forest Service can discourage polarization and avoid subsequent challenges and delays to implementation (22).**
3. **The process should be initiated only when the disagreement is amenable to negotiation. The agency or a mediator can assess the appropriateness of convening negotiations, and identify potential issues and procedural concerns (22, 330). ADR is most useful if the parties have the flexibility to determine which issues are ripe for resolution and which should be deferred (21, 22, 330).**
4. **The process should include all relevant parties, who can be identified by the agency or a *mediator.* Excluding critical interests will lead to controversy later, and could result in appeals or litigation. Thus, negotiations must accommodate a balanced and fully representative body of interests (22, 330). Furthermore, under NEPA and NFMA, all interested individuals and groups have an equal right to participate in the forest planning process.**

(continued on next page)

Box S-A-Opportunities and Limitations With Alternative Dispute Resolution-Continued

5. A neutral mediator is often useful. Because the agency is not neutral-it represents statutory and regulatory mandates, promotes certain organizational interests, and may have an interest m Particular outcomes (22, 50)-a mediator can be particularly useful and lend some perceived fairness to the process. A mediator may not be necessary, however, in cases where there are only a few parties, the issues are well-defined, and all the parties believe that they can reach an agreement without the aid of a mediator (22).
6. Time should be allowed for the process to work In many instances, ADR has been less costly and less time-consuming than appeals and litigation, but observers caution that ADR is not necessarily more expeditious than litigation or other decisionmaking processes. Furthermore, some stress that deadlines are important and should be established at the outset, considering the number of parties involved, the type and number of issues in question, the stage of the decisionmaking process, and any other relevant circumstances (22). To preserve flexibility, deadline extensions could be allowed (22). However, other interests may be affected by delays in decisions, and these impacts should also be considered
7. Agreements should be implemented. A potential benefit of ADR is that plans and decisions are less likely to be challenged and thus are more likely to be implemented. But since such processes are time-consuming and potentially costly, some assurance that the agreement will be implemented may be a necessary incentive to obtain cooperation (22). However, providing sufficient assurance maybe difficult, because the agency must still comply with the requirements of NEPA, NFMA, and the other laws that apply to forest planning and management.

Limitations of ADR

Not all decisions are amenable to successful resolution through negotiation and mediation. For example, if the parties' fundamentalvalues or interests are at odds, ADR may only result in further delay (25, 330). ADR is unlikely to be successful unless the issues in dispute are well-defined. ADR can be useful for specific, narrowly defined issues, but often the most contentious issues must be resolved through other means (22, 330).

The success of ADR also depends on the participation. It maybe difficult to gather a balanced group of participants, but excluding some critical interests could lead to litigation (25, 198). Furthermore, the parties may have significant differences in expertise and/or power, leaving some at a dative disadvantage (5, 25). Those perceiving their relative disadvantage might compensate for it by abandoning the ADR process and turning to Congress or the courts where they may have relatively greater power (201). Because of these potential disadvantages, the question of whether ADR is appropriate for resolving of a particular dispute or conflict is best determined by the parties themselves.

Finally, the use of ADR does not always lead to solutions. First, ADR is not free, and only saves time and money if the dispute could not have been resolved earlier and if ADR avoids more costly and time-consuming administrative appeals and litigation. Second, while voluntary negotiated agreements are more likely to be implemented (22), they confront the same technical, financial, and administrative difficulties faced by other plans and decisions (21). Thus, ADR is not a panacea, but simply one more useful tool in the planning and management of the national forests.

decisionmakers. Discretionary decisions, such as how to balance competing public interests, are typically upheld by the courts unless the decisions are clearly "arbitrary and capricious' or the result of an "abuse of discretion. ' In such cases, the plans may withstand administrative appeals and legal challenges, but not satisfy the participants, who may in turn seek legislative redress for the concerns.

The 1990 internal critique identified three criteria for measuring the effectiveness of public participation: 1) whether public participation had affected the decision, 2) whether the public and the Forest Service were committed to the plan, and 3) whether appeals could be avoided through negotiation and continued intensive public participation or conflict resolution (279). The critique also identified several reasons for improving the effectiveness of public participation in the planning process (276):

1. involving more people leads to better, more acceptable decisions;
2. challenges to the decisions can be avoided through informed consent;
3. challenges (appeals or litigation) can be withdrawn by resolving the dispute;
4. decisions are more defensible if the public has been involved; and
5. trust and credibility lead to general commitment to the decision, and eliminate ''fatal" challenges to implementation.

Two assumptions are implicit in these statements. First, public participation is assumed to be more effective if all or most of the interested and affected groups and individuals are involved. This traditional Forest Service view is a useful but incomplete view of the public's role in planning and decisionmaking. The second assumption is that public participation is primarily intended to achieve the "informed consent' of the participants to the forest plans. While the latter assumption casts the public in a more collaborative role, the former still emphasizes representation over accommodation.

Wondolleck (330) identified five factors leading to successful public participation: 1) building trust among participants; 2) promoting understanding of the issues and conflicts and of the reasons for underlying decisions; 3) incorporating conflicting values; 4) providing opportunities for joint fact-finding; and 5) encouraging cooperation and collaboration. These factors could provide a tangible framework with which to measure the success of public participation activities for particular decisions. Another observer suggests that plan and decision effectiveness should be measured by political feasibility, social acceptability, economic justifiability, environmental efficacy, and the technical competency to implement the decisions made (231).

Even the best and most effective public involvement cannot resolve all conflicts. Individuals and groups will continue to differ over the important values to be produced through national forest management. Effective involvement can build trust and promote understanding, but some participants will be unwilling to compromise or accommodate other values.

Such disputes necessarily lead to alternative means—traditionally, administrative appeals and litigation—for solutions. The Forest Service has increasingly used a variety of techniques, collectively known as alternative dispute resolution (ADR), to settle disputes outside these traditional avenues. (See box 5-A.) ADR is not a substitute for decision building or collaborative planning, but can be an effective tool for some challenges, because the issues and participants tend to be more narrowly defined in administrative appeals and litigation.

ADMINISTRATIVE APPEALS AND LITIGATION

In recent years, Members of Congress have expressed concern that the number of administrative and legal challenges to forest plans and activities indicate that forest planning has "broken down" (262, 263). Congress has been especially concerned over the effects on forest plan implementation—particularly on timber sales-of delays caused by appeals and litigation. These concerns have prompted calls to modify or streamline the systems for administrative and judicial review. In an effort to expedite the administrative appeals process, the Forest Service revised its appeals regulations in 1989. Others contend that delays because of appeals and lawsuits do not result from flaws in the systems, but rather are symptoms of interest in and concerns over national forest planning and management. Proponents of this argument believe that problems should be corrected: 1) through improved agency compliance with NEPA and NFMA, 2) through improved public involvement during plan development and implementation, and 3) through an end to congressional management direction (output targets and resource-specific funding) in annual appropriations.

This discussion examines the role of administrative appeals and litigation in forest planning and implementation, assesses the nature of problems attributed to appeals and litigation, and considers options for reform. Administrative appeals will be discussed separately from litigation, as the problems associated with each are different in nature.

Administrative Appeals

The Forest Service is not required by law to offer an administrative appeals process. Nonetheless, the agency has maintained various systems for administrative appeals of agency decisions since 1906(1 16). The systems have varied in formality and complexity; some processes have had standing requirements and have confined the right to appeal to those in a contractual relationship with the agency, while others have permitted any person having a grievance with particular agency decisions to request additional administrative review (155).

The Current Administrative Appeals System

The Forest Service currently has three sets of procedures for administrative reviews of agency plans and decisions. One set, 36CFR251.82, is used only for reviews of occupancy and use decisions, and is available only for the affected party. A second set, 36 CFR 211.16, provides an expedited system for requesting review of rehabilitation decisions following natural catastrophes, such as salvage sales following forest frees. However, most appeals, and concerns over the appeals process, are under the regulations, 36 CFR 217, governing the appeal of NEPA-related decisions (including forest plans and activities under those plans). The following discussion focuses solely on this appeals process.

The current system of administrative appeals within the Forest Service is relatively informal in nature. In contrast to the appeals systems in some Federal agencies, the Forest Service appeals process is not adjudicatory in nature-no administrative law judges or independent hearing officers review administrative decisions. The Forest Service's process is better characterized as an extension of public participation under NEPA and NFMA than as an adjudicatory process, because any interested party can file an administrative appeal on a forest plan or a NEPA-based decision on a specific project or activity that flows from a plan.

Appeals are made to reviewing officers, the direct supervisors of the decisionmakers. A second level of review can be requested, but the second review is discretionary, not a right of the appellant. For example, since forest plans must be approved by regional foresters, appeals challenging those plans are reviewed by the Chief of the Forest Service, with discretionary review by the Secretary of Agriculture. Likewise, decisions made by the forest supervisors are appealable to the regional forester, with discretionary review by the Chief. The reviewing officers can fully or partially affirm or reverse the original decisions, or may, under certain circumstances, dismiss appeals without review. The reviewing officers may also request that the deciding officer attempt to resolve or settle the issues in dispute with the appellants. (See box 5-A.)

Not all decisions are subject to review under 36 CFR 217. Only decisions recorded in a NEPA document (i.e., a Record of Decision, a Decision Notice, or a Decision Memo, and the related environmental disclosures) are subject to appeal under these regulations. Consequently, appealable decisions include timber sales, road and facility construction, forest pest management activities, measures to improve wildlife and fisheries habitat, and so forth. However, policy directives, agency handbooks, and other guidance for forest planning and management that do not require NEPA documents are not appealable. The regulations also set time limits on filing and processing appeals. However, the review period can be extended, to allow for the disagreement to be resolved through other means and for other reasons. Following a fina1 decision on an appeal, an appellant can seek judicial review of that decision in Federal district court under the Administrative Procedures Act.

The Current Appeals Situation

Many members of the public and of Congress are concerned over the number of administrative appeals, and the time and expense involved in processing them. In 1989, the General Accounting Office (GAO) reported that the total number of administrative appeals filed annually had more than doubled between 1983 and 1988, from 584 to 1,298 (252). Much of the increase can be attributed to the completion of forest plans; in 1983, forest plan appeals accounted for less than 1 percent of the appeals, but in 1988 they accounted for more than a quarter of the total appeals of NEPA-related decisions (252). However, appeals of timber sales also increased during this period (252). The total number of new appeals fell in 1989, but rose again in 1990 and increased substantially in 1991 (although 60 percent of the increase was attributed to one decision) (111,285).

The time needed to process appeals also rose significantly during the 1980s. The average processing time increased from 201 days in 1986 to 363 days by 1988, an increase of more than 75 percent, and more than 250 percent longer than is provided in the regulations (252). Appeals of forest plans generally require more processing time than other appeals (252), and thus some of the increase in time is the result of the increase in appeals of plans. In addition, the backlog of unresolved appeals has increased from 64 at the end of 1983 to 830 at the end of 1988, with forest plan appeals accounting for 44 percent of the backlogs in 1988, and to more than 1440 at the end of 1990 (1 11).

The cost of handling and processing appeals has also generally risen. The Forest Service reports that

servicewide costs for appeals (excluding costs incurred by the U.S. Department of Agriculture's Office of General Counsel) increased from approximately $2.8 million in 1983 to $10.1 million in 1988 (285, 300). Cost data for fiscal years 1989 and 1990 indicate that annual costs have decreased to approximately $7.8 million (285).

The increases in appeals appear to be due both to concerns over the emerging forest plans and to increasing concerns over timber sales in some areas. Although many appeals are described as harassment, especially when many timber sales on a forest are appealed, most appeals appear to be justified, because 90 percent have been reversed or remanded **(300), with** additional appeals reversed or remanded at the second-level, discretionary review (285). The majority of the reversals was because of NEPA-related problems (1 16).

The increase in processing times appears to be due to problems in complying with the appeals system, rather than with the system itself. GAO (252) found that, nationwide, the Forest Service was responsible for 94 percent of the total time overruns beyond the basic time provided for appeals in the regulations.

These problems have resulted primarily from the difficulties in responding to the growing number of sophisticated challenges to the environmental analyses by the Forest Service (252). Because NEPA has largely been interpreted through litigation, the Forest Service often must incorporate new standards and requirements into its pending appeal decisions, causing added delays. Nevertheless, the Congressional Research Service (CRS) echoed GAO's finding that the appeals system is not necessarily a problem in and of itself (300).

The administrative appeals process has been a valuable tool for the Forest Service. It has provided an internal mechanism for clarifying the legal requirements and for testing the soundness of decisions and the appropriateness of current policies and procedures (155). In addition, the appeals process can lead to better and more consistent decisions by encouraging more responsibility and accountability on the part of deciding officers (1 16). Through appeals decisions, the agency has clarified: 1) what decisions are to be made in forest plans, 2) the relationship between decisions made in the plans and those made during implementation, and 3) the standards for the environmental analyses required by NEPA (155). Appeals have also helped the agency establish uniform policies to address various issues, such as the nontimber benefits of below-cost sales; the adequacy of a plan's timber demand analysis; and the appropriateness of the plan's allowable sale quantity (155). Other issues addressed in administrative appeals have included guidance on management indicator species and biological diversity, and adequacy of resource monitoring plans (155). Because the appeals process has forced the agency to address and resolve novel and complex questions under NEPA and NFMA in this frost round of plan development, revising forest plans may be easier than preparing the initial plans (155).

The Forest Service revised its appeals regulations in 1989 in response to concerns over the growing number of appeals filed against final forest plans and to the significant increase in the amount of time needed to resolve those appeals, In addition, the Forest Service has recently initiated new efforts to rectify deficiencies. In January 1991, the agency began using its revised forest plan implementation training course. The course is designed to address various shortcomings, especially compliance with the analysis and documentation requirements of NFMA and NEPA. It is too early to tell whether these changes will ameliorate the conflicts surrounding forest management, and thus reduce the number of appeals and /or their impacts.

Implications and Consequences of Appeals

The implications of the growing number of appeals, and of the delays and costs they cause, are not precisely known. Some speculate that the delays in processing significantly reduce the amount of timber available for sale, causing serious economic impacts for local communities (252). Consequences for other resource uses and values are far less well-known, and are rarely debated, but should not be ignored. Nevertheless, the following discussion focuses on the impact of appeals on timber available for sale.

The available evidence does not support the assertion that administrative appeals have significantly decreased the volume of timber available for sale. GAO (252) concluded that, although impacts on timber availability vary by region, appeals of forest plans and activities have not significantly affected or delayed timber sale volume nationwide. In fiscal years 1986 and 1987, appeals were filed on only 6 percent of the total volume of timber offered for sale, and less than 1 percent of the total offered

volume was **delayed by those appeals (252). Furthermore, less than 6 percent of timber volume sold in each region, and less than 2 percent nationally, was delayed in fiscal year 1988 (295). However, these data exclude appeals resolved relatively quickly (in the same year they were filed) and meritorious appeals, where the agency's decision was determined to** be **inadequate. Finally, an analysis of the Forest Service timber program from 1969 through 1988 showed no significant decline in timber availability that could be attributed to administrative appeals (301).**

Nonetheless, administrative appeals can affect the timber sale program. The agency attempts to maintain an inventory or "pipeline" of approved timber sales that are available as substitutes for appealed sales, thus preventing serious gaps in timber flow. But, for a number of reasons, the inventory of planned timber sales with approved environmental analyses has declined in recent years (252, 300). According to the Forest Service, this "pipeline" problem has been more acute in some regions-such as the Northern Region (Montana and northern Idaho)--than in others (252). Appeals, in conjunction with inadequate environmental analyses and a reduction in the number of timber sales for which the requisite environmental analyses have been prepared, can reduce the flow of timber from the national forests (301). Furthermore, shortcomings in the agency timber program data may disguise the real impacts of appeals on timber availability.

Alternatives to Appealing Plans and Activities

Some have attributed the growth in the number of appeals and in the processing time to the current system of administrative appeals. It is argued that, because any activity can be appealed, the appeals system is used to force a reevaluation of forest plan decisions, and to harass authorized uses of the national forests. However, only NEPA-related decisions can be appealed, and thus policy directives and guidelines that can affect forest planning and management are not subject to appeals.

Some have suggested replacing the current Forest Service appeals process. One proposal is to establish a more formal, quasi-judicial appeals process, similar to that of the Interior Board of Land Appeals in the Department of the Interior. This system relies on an administrative law judge (or an independent hearing officer) to review the record on appeal, and arbitrate the solution (300). Another suggestion is to **create a "super** board' to hear appeals of decisions made by the Forest Service, the Bureau of Land Management, and possibly other land managing agencies, such as the National Park Service and U.S. Fish and Wildlife Service (300).

More typical proposals would change the current system of administrative appeals practiced by the Forest Service, rather than revise it wholesale (262). One suggestion is to require appellants to have participated in the planning process or to demonstrate that they would be directly harmed by the decision. Another proposal, to assure that the appellant is serious about the challenge, is to require a filing fee for appeals. A third approach is to shorten the time allowed for filing and processing, thereby reducing the delays caused by appeals. Another suggestion is to restrict appeals of activities to consistency with the plans, although how this fits with tiering of site-specific activity documentation and programmatic forest plans is unclear. (See ch. 4.) A fifth recommendation is to require negotiations before the reviewing officer examines the appeal. This might eliminate some appeals, particularly those resulting from misunderstandings, but is inconsistent with successful use of alternative dispute resolution. (See box 5-A.) In general, these proposals restrict access and/or expedite the process, and therefore attempt to eliminate "unnecessary" appeals and accelerate implementation of forest plans and activities.

Changing the current administrative appeals system might not yield the desired results, however. The GAO findings suggest that the problems are not principally due to the system; the delays and time overruns were mostly attributable to the agency's inability to meet the deadlines (252). Furthermore, the agency reversed or modified its decisions in 40 percent of the timber sale appeals resolved in Washington, Oregon, Montana, and northern Idaho between 1985 and 1988 (252). Thus, appeals have apparently played a significant role in exposing inadequate environmental analyses and documentation. If the current system is modified to reduce access or expedite processing, it may simply lead to more litigation by dissatisfied parties.

The Forest Service revised the appeals regulations in 1989 to expedite appeals processing. The impact of the changes is not yet fully known, but the second-level "discretionary review procedure does not appear to be working' (285). To the extent the

changes do not reduce the number or processing time of appeals, additional changes may be warranted. The Forest Service is also encouraging the use of alternative dispute resolution to avoid and/or settle appeals (116). Such a technique can be effective for settling disputes, and thus is a valuable alternative to administrative and legal challenges. More effective public participation and more widespread use of alternative dispute resolution in planning and implementation may result in fewer appeals of plans and projects.

Ultimately, forest planning and implementation involve a host of complex political and technical questions. Administrative appeals constitute a valuable check on Forest Service decisionmaking by providing additional administrative review of sometimes highly controversial plans and projects. Appeals provide the public with a final administrative opportunity to question the appropriateness of decisions on land use, resource allocation, and standards and guidelines. As NEPA has been interpreted by the courts, administrative appeals have helped the agency to assure that decisions are modified when necessary to comply with NEPA requirements. Appeals have also encouraged consistency and accountability throughout the National Forest System. Thus, many of the features of the current system should be retained. Modifications could expedite the process while preserving the general purposes and structure of the system. Solutions that focus on correcting management problems responsible for some of the appeals can improve plan implementation.

Litigation of Plans and Activities

Many in Congress are also concerned that litigation of forest plans and activities has led to intolerable delays in implementing those plans and activities (263). Some even suggest that appeals and litigation are often used "offensively" to **delay implementation of the plans for as long as possible (28). This section briefly examines the role of the courts in the Federal forest planning process, describes the impacts of litigation on forest plan implementation, and discusses some options for reform.**

Judicial Review

Neither NEPA nor NFMA expressly provide for judicial review of forest plans and activities. Nonetheless, since the passage of these two laws, the courts have played an increasingly significant role in forest planning and implementation.[4] Federal courts exercise jurisdiction over forest planning under the Administrative Procedures Act.[5] APA authorizes Federal courts to review Federal agency actions, except when a statute precludes judicial review of a particular action or commits the decision to agency discretion. Standing requirements are fairly broad: any person ''suffering a legal wrong because of agency action, or adversely affected or aggrieved by agency action within the meaning of a relevant statute, is entitled to judicial review thereof" (5 U.S.C. 702). The law once required persons to demonstrate pecuniary damage to obtain judicial review of agency actions, but such direct financial interests are no longer necessary.

The 1897 Organic Act and MUSYA vested significant management authority in the Forest Service, with relatively few constraints on the agency's discretion to allocate resources or to regulate the occupancy and use of the national forests. Consequently, prior to NEPA and NFMA, most agency actions were essentially immune from close judicial review (324). However, NEPA and NFMA contain a number of procedural and substantive requirements for forest planning and management, and thus subject agency decisions to closer scrutiny by the courts. In addition, several environmental laws, including the Endangered Species Act, contain provisions authorizing private citizens to challenge agency actions in court.

Courts can prohibit the Forest Service from implementing a plan or pursuing a particular action if the agency fails to comply with procedural or substantive requirements of NEPA and NFMA. However, except for clear violations of statutory procedure or substance, courts remain relatively deferential to agency expertise and discretion, and will generally uphold agency actions unless they are shown to be arbitrary and capricious or an abuse of discretion. This broad deference is tempered some-

[4]NFMA was passed in an attempt to "get the Forest Service out of the courts and back in the woods,' but it seems not to have been effective in fulfilling this purpose.

[5]District court jurisdiction is established under the ''Federal Question" statute (Act of June 25, 1948, ch. 646 (62 Stat. 930), as amended; 28 U.S.C. 1331).

what by the ''hard look' standard of judicial review. (See ch. 4.)

Implications and Consequences of Litigation

In contrast to the substantial and growing number of administrative appeals, relatively few Forest Service plans and activities are litigated. Of the roughly 500 forest plan appeals finalized in fiscal year 1989, only 11 ended up in Federal court (300). Furthermore, only 32 timber sales were litigated in fiscal year 1989 (300), out of about 500 timber sale appeals and 525,000 timber sales. As of March 1, 1991, 6 cases were litigating regional guides (regional direction for forest planning), 15 cases were litigating forest plans, and 7 other cases were based on NFMA (289). A total of 66 lawsuits challenging timber sales were pending as of April 17, 1991, including 21 challenges in California and 35 in Washington and Oregon (1 11). Thus, despite claims that the growing number of legal challenges to forest plans and activities threatens efficient and effective forest management, the existing evidence suggests that the Forest Service is rarely sued over its plans and activities.

This is not to suggest that the few lawsuits do not have substantial economic impacts, particularly in certain regions, such as the Pacific Northwest. Litigation can often be complex and lengthy, and the subsequent delays may have a significant impact on the planning and management of the national forests at any given time. For example, several lawsuits are challenging the Regional Guide Amendments on Spotted Owls, but at least two[6] have been stayed pending resolution of the principal challenge-- ***Seattle Audubon Society v. Robertson, No. C89-160*** (W.D. Wash.). While the exact impact of the spotted owl litigation is highly debatable, most estimates suggest that tens of thousands of timber industry jobs could be affected by the decision. On the other hand, the plaintiffs obviously believe that the litigation is needed to protect existing values associated with the old-growth forests. What is clear from this example is that, while few agency plans and decisions are litigated, such litigation can have immense consequences on agency activities over an extended period.

Possible Reforms for Judicial Review of Forest Service Plans and Decisions

In an effort to curb some of the impacts of litigation of Forest Service (and Bureau of Land Management) timber sales, Congress has enacted a number of riders to appropriations laws that preclude judicial review of certain decisions. Between 1985 and 1989, these riders have exempted a broad range of management decisions from judicial scrutiny. Riders have been used: 1) to exempt decisions to resell timber returned under the Federal Timber Contract Payment Modification Act of 1984 from judicial review; 2) to proclaim that environmental impact statements for certain timber sales, roads, and other activities "shall be treated as satisfying' the requirements of NEPA and **NFMA and consequently not subject to administrative appeal or judicial review[7]; and 3) to preclude judicial review of challenges to existing plans solely because the plans are outdated or fail to incorporate new information (28). Opponents of such provisions contend that appropriations bill riders circumvent the legal direction for forest planning in NEPA and NFMA, and that solutions to forest planning and management controversies should be made only after careful review by the authorizing committees (143).**

Other, more comprehensive reforms have also been suggested (300). One proposal is to legislatively encourage, or even to require, the use of alternative dispute resolution techniques to avoid or resolve administrative appeals and litigation. (See box 5-A.) A second option is to eliminate one level of judicial review; cases that have completed the administrative review process would be heard directly in Federal appeals courts, possibly with appeal directly to the U.S. Supreme Court. Another suggestion is to develop a bifurcated system, whereby certain issues (e.g., those involving activities under the plans) go to the district courts, and others (e.g., those involving forest plans) go directly to the courts of appeals. A fourth option is to establish a new Federal Lands Court to hear legal challenges to land and resource management plans and activities for both the Forest Service and other Federal land

[6] *Northwest Forest Resource Council v. Robertson*, NO. 89-136FR (D. Oregon), consolidated with *Western Washington Commercial Forest Action Committee v. U.S.F.S.*, *No.* 89-139 (D. Oregon).

[7] The Ninth Circuit Court of Appeals held that part of this rider was unconstitutional. The court recognized Congress's general constitutional authority to exempt certain decisions from NEPA and NFMA, but held that the language of the rider was unconstitutional, because it violated the separation of powers doctrine by dictating judicial findings as to the sufficiency of the environmental impact statements.

managing agencies. The opportunities and limitations of such measures were the subjects of a 2-day workshop sponsored by the Congressional Research Service in 1989, and a more detailed analysis can be found in the CRS Report, ***Appeals of Federal Lund Management Plans and Activities: A Report on a CRS Research Workshop (300).***

To the extent that plaintiffs are successful on the merits of their legal claims, and to the extent that other lawsuits filed have not generally been frivolous or otherwise unwarranted, the current system of judicial review seems to be serving its intended purpose. Citizens are allowed an opportunity to challenge the legal basis for agency plans and decisions. Thus, judicial review provides a valuable independent check on the agency's compliance with its legal requirements. At least some Members of Congress seem committed to preserving citizens' rights to judicial review of forest planning and management decisions:

> The rights of our citizens to use the courts to protect our forests should not be abridged. We must find a way to protect our citizens' rights and our forests (143).

The available information suggests that the lawsuits filed against the Forest Service generally can be attributed to the agency's inadequate compliance with NEPA, NFMA, and other laws, such as the Endangered Species Act and the Clean Water Act. Improved compliance with applicable law is likely to reduce the successful legal challenges to Forest Service plans and decisions. Thus, the immediate challenge is to make the planning process work more effectively and efficiently, while preserving the basic function of the courts.

Much of the current controversy over administrative appeals and litigation has arisen because of one issue—the protection of spotted owls and old-growth forests in the Pacific Northwest. It seems premature to revise the nationwide judicial review process for forest planning and management because of one admittedly calamitous clash of values. Changing the judicial review process appears to be an attempt to resolve the substantive debate about the fate of old-growth forests, without forcing Congress to choose between forest protection and timber production. Further study and analysis of ways to expedite forest management-related litigation may be warranted. In the meantime, however, it may be more pressing to address management-related problems that have led to agency failures to comply with planning and environmental laws.

STATE, TRIBAL, AND LOCAL GOVERNMENT PARTICIPATION

Other Federal agencies and non-Federal government organizations have additional requirements and opportunities to participate in Forest Service planning. The requirements generally revolve around State jurisdiction over water and wildlife. In addition, MUSYA and NFMA provide for Forest Service coordination with State, tribal, and local governments and other Federal agencies in the planning and management of the national forests. Finally, States and local governments have interests in national forest management, which may go beyond the traditional consideration of direct employment and income generated by national forest outputs.

State Legal Responsibilities

The legal framework governing national forest planning and management generally recognizes State responsibility for water rights and for fish and wildlife. The 1897 Organic Act specifies that:

> All waters within the boundaries of forest reserves may be used . . . under the laws of the State wherein such reserves are situated . . .

State jurisdiction over national forest waters is implicit in MUSYA, since MUSYA is to be ''supplemental to, but not in derogation of, the purposes for which the national forests were established as set forth in the Act of June 4, 1897." Furthermore, State authority over fish and wildlife is expressly provided in section 1 of MUSYA:

> Nothing herein shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish on the national forests.

Since NFMA directs that land and resource management planning for the national forests is to be consistent with MUSYA, NFMA also implicitly endorses State authority over the waters and the wildlife of the national forests.

In addition to these directions in the 1897 Organic Act and in MUSYA, the Wilderness Act and the Wild and Scenic Rivers Act of 1%8 expressly provide for State jurisdiction over water rights and wild animals. Section 4(d) of the Wilderness Act specifies that:

> (7) Nothing in this Act shall constitute an express or implied claim or denial on the part of the Federal Government as to exemption from State water laws.
>
> (8) Nothing in this Act shall be construed as affecting the jurisdiction or responsibilities of the several States with respect to wildlife and fish in the national forests.

The Wild and Scenic Rivers Act of 1968 provides similar language for State authority over fish and wildlife, and then provides much more explicit guidance on the relationships between State water rights and efforts to preserve the wild and scenic qualities of the designated rivers.

In addition to the traditional State authority over water rights and wild animals, the States set and enforce water and air quality standards, under the Clean Water Act and Clean Air Act, respectively. As noted in chapter 4, States are authorized to establish standards more stringent than those imposed by the Federal laws, and Federal agencies must comply with State standards. Thus, Forest Service practices must meet the State standards for water and air quality.

Most States also regulate forest practices--silvicultural techniques, the percentage of a watershed that can be clearcut within a specified period, and so forth (114). Since many of these regulations are imposed to achieve water and air quality standards, they may be applicable to national forests as well. Even if the Forest Service is not subject to State requirements, however, the Forest Service must, at a minimum, be aware of State forest practice regulations and their implication for management of national forests and adjoining lands.

Cooperation With Other Agencies

Direction for Forest Service cooperation with other government agencies was frost expressed in section 3 of MUSYA:

> . . . the Secretary of Agriculture is authorized to cooperate with interested State and local governmental agencies and others in the development and management of the national forests.

RPA reinforced this direction in its requirement to prepare land and resource management plans for units of the National Forest System; such plans are to be:

> . . . coordinated with the land and resource management planning processes of State and local governments and other Federal agencies.

Section 12 of NFMA adds that "information and data available from other Federal, State, and private organizations' shall be used in forest planning. And, State, tribal, and local governments can also participate in national forest planning through the public participation provisions of section 6(d),

As with public participation, agency participation and coordination is not guaranteed to influence national forest decisionmaking:

> The opportunity to comment on a proposed federal action does not necessarily give state and local government any meaningful leverage over federal land use decisions (55).

Furthermore, the 1982 revision of the NFMA regulations reduced the emphasis on Forest Service cooperation with State and local governments (20).

A complicating factor in intergovernmental coordination in forest planning is the variety of State agencies with an interest in national forest management. At a minimum, States typically have one agency administering water rights and possibly enforcing water quality standards, another agency responsible for fish and wildlife, and a third agency to manage State forest lands and to regulate forest practices. These separate agencies often have different, potentially conflicting interests in national forest planning and management, and it can be quite difficult for the Forest Service to coordinate with the State when the State presents conflicting views.

The State of Oregon recognized this difficulty, and believed that a unified State response would have greater influence on the plans for the national forests in the State (20). The State was fortunate to be able to assemble a small team of experienced experts, with ready access to the Governor's office, to achieve a unified response. In addition, the State Forestry Department and Oregon State University had already begun a cooperative assessment of the timber resources on all timberlands in the State. Subsequently, the Governor and the Oregon congressional delegation were able to forge a short-term legislative compromise between timber interests and environmentalists for continuing timber sales despite the ongoing litigation over spotted owl protection. Finally, the ongoing concern about spotted owl protection had led to a study of timber management

options for all landowners. The State's wealth of new data on timber resources and timber management, and its ability to reach a compromise among interests, greatly contributed to its success in influencing the forest plans for the national forests in Oregon (20).

While the State of Oregon benefited from unique circumstances, its experience illustrates that a unified response among State agencies provides clearer input, and thus makes a direct Forest Service response more feasible. If other States wish to influence national forest planning, coordinating the positions of the various agencies and providing a harmonious stance may be necessary.

Local Concerns

State and local governments also have direct interests in the management of the national forests. First, the Forest Service returns 25 percent of its gross revenues to the States for use on schools and roads in the counties where the national forests are located. Thus, State and especially local governments have a financial interest in national forest management that generates revenues. (For a more thorough discussion of this concern, see ch. 8.)

In addition, elected State and local officials are representatives of the people, and thus are surrogates for the public acting collectively. The public as citizens is an important role (231, 239), but the Forest Service typically views the public as individual interests. State and local government participation in forest planning provides one means for including this important aspect of the public's interests. (See ch. 5.)

Finally, State and local governments have a stake in maintaining the employment and income of their citizens. Activities in the national forests support local jobs, and debate over community stability reflects this interest. (Again, see ch. 8.)

The Federal Government may also have an interest in maintaining the economic stability of localities. Under the "fabric-of-government" theory, the multiple levels of government work cooperatively to support the interests at all levels (312). This position is based on the vision that local and regional economic health and vigor is in the national interest, and the Federal Government is, therefore, a partner in influencing State and local economies. If one accepts the fabric-of-government theory, then the Forest Service has a direct interest in cooperating with State and local governments to maintain their economies. (The alternative view, the ''assignment-of-powers' theory, asserts that each level of government has separate and distinct responsibilities. State and local economies are viewed as State and local responsibilities; national interests pertain only to benefits for all Americans or at least multi-State regions.)

The joint management of forest ecosystems also generates State and local interest in national forest management. National forests are part of these ecosystems, and their management should be coordinated with the management of other forested lands to protect ecosystem health and productivity. Some ecosystem requirements, such as wildlife migration corridors, particularly need some form of coordination among landowners.

States not only have an interest in coordinated forest management, they also have some responsibility for, and some expertise in, such management (20). As discussed above, many States regulate forest practices on at least State and private lands, Many States also have statewide forest resource planning programs, funded in part through the Forest Service's Cooperative Forestry Assistance Program (in the State and Private Forestry Branch of the agency) (102, 103). These State forestry activities—forestry regulation and statewide resource planning—implicitly recognize that forests are ecosystems. Therefore, States have some particular expertise and interest in coordinating forest management, and such expertise should be given a full hearing in national forest planning and management.

SUMMARY AND CONCLUSIONS

Public participation is essential to developing forest plans that the public will accept as appropriate management direction for the national forests. Public participation operates at several stages of planning and implementation: during the development and revision of forest plans; in implementing those plans; and when requesting administrative and/or judicial review of agency plans and decisions. Finally, the public participates through the coordination of Forest Service planning and decisionmaking with State, tribal, and local governments.

Public Participation

Public participation in Forest Service planning and decisionmaking is required bylaw. The Multiple-Use Sustained-Yield Act of 1960 (MUSYA) requires that management 'best meet the needs of the American people," which can only be determined by identifying the public's values and desires. The National Environmental Policy Act of 1969 (NEPA) requires agencies to inform the public about the possible environmental impacts of their decisions, including the public as a participant in decisionmaking rather than as a mere recipient of information.

Congress reinforced the public's right to participate in Forest Service planning and decisionmaking in the National Forest Management Act of 1976 (NFMA). Senator Humphrey, the chief sponsor, described the public as advisors to agency planners and decisionmakers. NFMA also authorized the use of advisory boards in planning and managing the national forests, but the Forest Service has not used this authority.

Although the Forest Service has long included the public in its planning and decisionmaking, the public remains critical of agency efforts. Recent studies have shown that the public does not understand why the agency makes the decisions it does, and believes it has little influence on the agency. Thus, the public perceives that the Forest Service has failed in its public participation responsibilities.

One explanation for the perceived failure is that the Forest Service model of participation is based on due ***process,*** on receiving full and equal representation of various views and values. Thus, each interest is forced to argue the ''rightness' of their position and the ''wrongness' of other positions. This process is divisive and promotes conflict and distrust among the interests and with the agency. It also means that "success' is measured in numbers of views, participants, and opportunities. Forest Service failures are also blamed on insufficient data on who the participants are and how they prefer to participate. Others suggest that the agency resists meaningful participation because its traditional autonomy and professionalism inhibit listening to ''nonexperts. Finally, some observers have noted that public participation is limited by the focus on resource outputs and budgeting and the lack of managerial incentives for effective participation.

The Forest Service has had numerous successes in involving the public in national forest planning. Typically, successful managers have a clear idea of why the public is to be involved-to determine what is truly in the publics' interests. Furthermore, they often understand the goals of public participation—to gain insights into the public's values, to provide an early warning of potential problems, and to be accountable to the public. However, the Forest Service also needs a model of public involvement that recognizes the various roles of the public: as individuals, as organizations, as producers, as consumers, and as citizens. This broader view of the public can lead to open discussions and joint understanding of situations, limitations, and possibilities.

Such a model of public participation leads to a quite different approach to planning and decisionmaking. Under this approach, sometimes referred to as open decisionmaking or as decision building, the agency and the public are both contributors to decisions. Decisions are reached through dialogue and mutual deliberation, with sustained interaction to find the common ground and to build acceptable decisions. This model also suggests that, instead of balancing interests and adjudicating conflicts, Forest Service managers become leaders in organizing and facilitating debate and public analysis. This approach not only involves the public in decisionmaking, it helps the participants to understand why certain decisions are reached. There is no simple formula or technique for open decisionmaking or decision building. The best means of involving the diverse publics will vary regionally and among interests.

The Forest Service has recognized the need for criteria of successful participation, and has suggested that success includes decisions affected by the public, public and agency commitment to implementing the plan, and fewer administrative appeals. Others have suggested that key elements of success are mutual trust and understanding.

It will not always be possible to develop plans and decisions that are acceptable to all parties. Alternative dispute resolution techniques can help to resolve some differences. Such techniques, used in conjunction with open decisionmaking/decision building, could reduce the conflicts over national forest management. Nonetheless, the traditional techniques of administrative appeals and litigation will still be

used occasionally, when differences cannot be resolved satisfactorily.

Appeals and [litigation

Many members of the public and of Congress believe that administrative appeals and litigation are preventing the implementation of national forest plans, and that this indicates the failure of the planning system. The number of administrative appeals-internal, relatively informal reviews at the request of a member of the public—more than doubled between 1983 and 1988, and the average processing time also increased substantially. Much of the increase can be directly attributed to the completion of forest plans, although the number of timber sales being appealed has also risen, and the Forest Service has not been meeting the regulatory deadlines for processing appeals. However, the appeals system has been useful for helping the agency to cope with evolving standards for meeting the requirements of NEPA and NFMA.

The increasing number and processing time of appeals has been described as a problem, particularly by delaying the sale and harvest of timber. Although evidence of significant delays is lacking, the aggregate data available could be masking serious local problems.

Various proposals have been offered to address the apparent problems of Forest Service administrative appeals. Some would overhaul the system completely, replacing the current, informal system with a more structured, formal system akin to that of the Department of the Interior's Board of Land Appeals. Most suggestions would alter the current system less radically, typically either by restricting access to appeals through standing requirements or a filing fee, or by expediting processing through shorter deadlines or required negotiations. However, such options could be counterproductive, if the result is fewer appeals but more litigation.

Litigation—judicial review of agency decisions—can lead courts to prevent the agency from implementing plans or pursuing actions, if the decisionmaking did not comply with the procedural and substantive requirements of NEPA and NFMA. Relatively few administrative appeals of Forest Service plans or decisions actually lead to litigation. Currently, only 28 cases are pending over NFMA decisions, and only 66 cases are pending over timber sales. Nonetheless, few lawsuits can have immense consequences. The largest and best known example is the case over the spotted owl supplement to the Pacific Northwest Regional Guide, for NFMA planning in Washington and Oregon. This case could affect tens of thousands of jobs in the Pacific Northwest, but the plaintiffs assert that the guide could allow the extinction of the owl and the elimination of other values associated with the old-growth forests the owls inhabit.

Some problems resulting from litigation of Forest Service planning and decisionmaking have been addressed with riders on the annual Forest Service appropriations to preclude judicial review of specific decisions or on certain bases. Such riders have become increasingly controversial, as the authorizing committees recognize the increasing use of appropriations to establish management direction for the national forests. Other reforms have been suggested, such as requiring the use of alternative dispute resolution techniques, eliminating one level of judicial review, developing a bifurcated system (with some decisions reviewed by district courts and others reviewed initially by appellate courts), or establishing a new Federal Lands Court.

However, one must be careful in revising the current system of judicial review for Forest Service planning and decisionmaking. Successful litigation suggests that the Forest Service is not complying with its legal requirements. If the requirements cannot be met, Congress should consider changing the laws, not simply preventing the laws from being enforced. Furthermore, much of the current controversy is over the spotted owl. Some have suggested that Congress is attempting to avoid the appearance of choosing sides in the debate, and is attempting to resolve the substantive issue by altering the system of judicial review. It maybe inappropriate to change the system because of one, albeit monumental, lawsuit.

State and Local Government Participation

State, tribal, and local governments have particular interests in national forest planning and management. States have jurisdiction over and responsibility for certain resources, such as water rights and fish and wildlife management, and the laws governing

Forest Service planning and decisionmaking preserve these State rights. Furthermore, many States regulate forest management practices, at least on State and private lands. Thus, cooperation between the Forest Service and the relevant State agencies is an important part of national forest planning.

MUSYA and NFMA require the Forest Service to cooperate with State and other government agencies. However, cooperation does not provide the States or other governments with any meaningful leverage to influence plans or decisions. The State of Oregon, through a fortunate combination of people and circumstances, was relatively successful at influencing national forest plans. The State coordinated its various agencies for water quality, forest practices, fish and wildlife management, etc., and thus provided harmonized responses to the forest plans. The success of their efforts strongly suggests that consistent, coordinated State responses to Forest Service plans and decisions are more likely to be influential than independent agency responses.

Finally, **State** and local governments have additional interests in maintaining their economies and in sustaining ecosystems. The fabric-of-government theory suggests that the Forest Service is a partner in supporting regional and local economies. Furthermore, State and local governments represent the public acting as citizens, and thus represent particular interests that are relevant to land and resource management planning. Finally, coordination among the various landowners is necessary to sustain ecosystems. States, through their forest practice regulations and their State forest resource planning, have expertise and knowledge to offer in coordinating management of multiple landowners.

Chapter 6

Biological Dimensions of Forest Planning

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Chapter 6
Biological Dimensions of Forest Planning

INVENTORY AND MONITORING IN A STRATEGIC PLAN

Strategic planning requires systematic monitoring of resources to assess trends and manage according to public desires. An inventory of resources is necessary to provide baseline data on what exists on the forests. Monitoring leads to a continuous record of information on the quality and quantity of resources and permits an evaluation of trends. Monitoring activities can be adjusted to respond to trends, changing interests, and emerging issues.

The Forest and Rangeland Renewable Resources Planning Act of 1976 (RPA) and the National Forest Management Act of 1976 (NFMA) call for an integrated approach to resource management:

> In the development and maintenance of land management plans . , . the Secretary shall use a systematic interdisciplinary approach to achieve integrated consideration of physical, biological, economic, and other sciences (section 6(b)).

The integrated approach was to minimize duplication of data gathering and to facilitate considering interactions among resources in developing forest plans (174). Some researchers consider inventories aimed at collecting data on one resource, such as a timber survey, to be multiresource inventories, because some of the collected information might be useful to an analysis of other resources, such as wildlife habitat. Lund (156), however, limits multiresource inventories to those with planned integration. He defines an integrated inventory system with six characteristics: 1) adaptable to a wide range of ecological conditions; 2) easy to use at different levels of management; 3) replicable and suitable for statistical analyses; 4) flexible enough to fulfill different information needs; 5) adaptable to a monitoring program; and 6) suitable for use with automated data processing. An integrated resource inventory also includes a multiresource component that emphasizes interactions among variables (174).

Because planning under NFMA calls for an integrated approach to resource management, the Forest Service must structure inventory and monitoring programs around integrated multiresource characteristics. This is not an easy task. An inventory and monitoring system that exhibits integrated multiresource characteristics will result, by its very design, in compromises in the gathering and analysis of data (174). For example, rangelands are defined by several physical features (topography and soil conditions) as well as a suitability factor for grazing by domestic livestock or wildlife. To inventory and monitor adequately the range-forage resource, the Forest Service must make specific decisions regarding which elements or combination of elements (interactions) to address, including specific methods of inventory, data analysis, and model development (174). The many decisions required to define the resource characteristics and ensure an integrated design make it extremely difficult to strive for an integrated multiresource inventory and monitoring program.

RESOURCE INVENTORY AND MONITORING IN THE FOREST PLANS[1]

Inventory and monitoring require the collection of information. When data collection is planned efficiently, inventory information can also be used in monitoring, and monitoring can be used to update and improve inventories (137). The primary difference between the two activities is that inventories are used to guide plan development, while monitoring is used to measure plan implementation and effects. An inventory might include collecting data on sizes and types of trees, or number of eagle nests with young. Monitoring would then include maintaining the records of tree size and type, or number of eggs hatched over time, to permit a determination of trends-in annual growth rates or hatching success. Both resource inventory and monitoring are essential to the evaluation of resource conditions on

[1]OTA did not try to review all Plain for national forests. In addition to the traditional published information and discussions and interviews, however, OTA did contract for background papers that reviewed plans for 11 national forests in depth and several others in less detail. Eight of the indepth plans were chosen randomly to represent each of the eight Forest Service regions (137). Three additional case studies were conducted, one each in the eastern (238), southwestern (166) and northern (42) regions. The selection of these forests was not to point to particularly good or bad plans, but to illustrate problems that are inherent in many of the plans.

the national forests and to the proper implementation of management activities.

Since NFMA was enacted and the regulations have been in effect, several problems have surfaced in relation to inventory and monitoring activities conducted by the Forest Service. Problems common to both inventory and monitoring are discussed below. Problems unique to data gathering or to monitoring programs are then addressed in separate sections.

Forest inventory and monitoring have been criticized for failing to produce an integrated, multiresource program. The scientific community, which has participated in long-term discussions on what constitutes appropriate inventory and monitoring, is as much to blame for this failure as the Forest Service (174). Although there is general agreement on the need for rigorous application of proper sampling design and statistical analyses, ''few clear guides exist in the scientific literature on how specific resources should be inventoried and monitored" (174). Advanced academic training and extensive research experience are required to design inventories, analyze inventory data, and establish monitoring programs that will achieve an appropriate standard. The scientific community, however, has not agreed on the makeup of a "rigorous and proper' sampling design. And, the Forest Service has not been quick to institute an integrated multiresource program, because specific designs and analytical techniques have not been established, and because the agency has not had enough experts to design such programs.

Slowness in developing an integrated multiresource inventory and monitoring system also can be blamed on the Forest Service's historical emphasis on inventory of the timber resource. Before passage of RPA and NFMA, inventorying by the agency concentrated primarily on ways to maximize timber production (162, 174). Inventory and monitoring programs used by the Forest Service today attempt to include integrated, multiresource inventories but are designed largely by retrofitting timber-oriented programs (174).

> Even in 1986, in the absence of final Forest Plans, functional timber management plans were still prepared and were still the basis of most day-to-day management activities (122).

Retrofitting a timber-focused program to include integrated, multiresource inventories has persisted in forest planning for three reasons. First, agency personnel have training and experience in specific techniques and are slow to change (174). Second, substantial changes in sampling design may impede the use of previously collected data. Finally, the original version of FORPLAN, the primary forest planning model, was not designed to address forest multiresource interactions. (See also ch. 7.)

Another shortcoming of forest inventory and monitoring programs has been the failure to address ecosystem processes, and the lack of attention to appropriate spatial and temporal scales for examining ecosystems. The enormous complexities of nature-soil formation, plant growth and succession, decomposition by fungi and bacteria, modifications by invertebrates and vertebrates, and natural catastrophes, especially forest frees-should be accounted for in an inventory and monitoring program (174). In the past, many ongoing resource inventories were designed to furnish information about the condition of a single resource for a small land area, such as a timber sale or a report on range or watershed improvement needs (166). In contrast, inventory data for a forest plan must provide information on a forestwide basis, often a million acres or more, for decisions that need to be made in the planning process. An inventory of timber stands does not address ecosystem elements. Aggregation of timber stands into larger units will also not address interactions that go beyond the stand boundaries, such as water flows and wildlife movements. In addition, appropriate temporal scale must be adopted for evaluating ecological systems. For example, sampling wildlife in only one season (e.g., summer only or winter only) will bias data collection to breeding or wintering requirements. Data for a forest plan must, therefore, be collected at the appropriate scale (in time and space) and be more organized-by resource as well as by site, date of information, and possible interrelated effects-than data collected under a nonintegrated approach for small areas (166)$_0$

Data collection and monitoring by the Forest Service has also been criticized for not being sensitive to statistical requirements for effective data analysis. Critics have pointed to several key components for statistical evaluation of data: clear identification of variables to be evaluated; accuracy and precision of variable estimates; and adequacy of

sample sizes (174). The weaknesses in statistical validity of Forest Service inventories and monitoring have been attributed to the lack of biometricians on the planning teams.[2] This lack of expertise has resulted in the inability to improve data collection and analysis for accurate reporting of resource conditions and trends (174).

Problems with inventory and monitoring activities of the Forest Service are made worse by the lack of adequate funding (166). Monitoring is expensive and funding has not been provided for the systematic completion of forestwide inventories for most resources. For example, range managers on a national forest may use a variety of range inventories. Analysis of some allotments may have been completed recently and include field measurement of forage use. Other allotments may have been inventoried many years ago, using different inventory techniques. Some allotments may never have been inventoried (166).

Verner (304) provided a worst case scenario in response to the question, ''Can we afford reliable monitoring systems?" He used the pileated woodpecker ***(Dryocopus pileatus)*** to illustrate that the cost of monitoring annual changes in abundance on a particular forest for this species could exceed $1 million per year. The potentially high costs of monitoring activities, and the lack of adequate funding, require managers to analyze costs carefully as the monitoring plans are being developed.

RESOURCE INVENTORY

Inventory Requirements in NFMA and the Regulations

NFMA directs the Forest Service to obtain ''inventory data on the various renewable resources, and soil and water' (section 6(g)(2)(B)) and to base the forest plans on those inventories (section 6(f)(3)). NFMA contains several planning requirements that imply the need for resource inventories. For example, plans are required to provide 'sustained yield of products and services" (section 6(e)(l)) by generally limiting timber harvests to ''a quantity which can be removed . . . annually in perpetuity' (section 13(a)). To meet this requirement, a national forest must have inventory information on the stocks and growth rates of its trees.

Other planning requirements that depend on data from resource inventories are associated with land capabilities. Plans are required to ensure that timber is harvested only under certain conditions: lands that are suited for timber production considering physical, economic, and other pertinent factors (section 6(k)); lands where adequate reforestation can be assured within 5 years after harvest (section 6(g)(3)(E)(ii)); and lands where soil, slope, or other watershed conditions will not be irreversibly damaged (section 6(g)(3)(E)(i)). In developing the timber program, the forest must provide for the protection of water bodies ''where harvests are likely to seriously and adversely affect water conditions or fish habitat" (section 6(g)(3) (E)(iii)). Plans must also provide for the diversity of plant and animal communities based on the suitability and capability of the specific land area (section 6(g)(3)(B)). NFMA also requires the plans to be revised when conditions have significantly changed. Again, developing and maintaining resource inventories can facilitate fulfilling these requirements.

NFMA's requirements for resource inventories are reiterated and expanded in the regulations governing forest planning issued by the Forest Service in 1979 and revised in 1982:

> Each Forest Supervisor shall obtain and keep current inventory data appropriate for planning and managing the resources under his or her administrative jurisdiction. The Supervisor will assure that the interdisciplinary team has access to the best available data. This may require that special inventories or studies be prepared. The interdisciplinary team shall collect, assemble, and use data, maps, graphic material, and explanatory aids, of a kind, character, and quality, and to the detail appropriate for the management decisions to be made. Data and information needs may vary as planning problems develop from identification of public issues, management concerns, and resources use and development opportunities. Data shall be stored for ready retrieval and comparison and periodically shall be evaluated for accuracy and effectiveness (36 CFR 219.12 (d)).

The regulations require: specific inventories of roadless areas (36 CFR 219.17); fish and wildlife

[2] J. Verner, U.S. Department of Agriculture, Forest Service, Forestry Sciences Laboratory, Fresno, CA, personal communication, October 1990.

[3] Based largely on Krahl et al. 1990 (137).

populations (36 CFR 219.19); forage production and range conditions (36 CFR 219.20(a)); recreation opportunities (36 CFR 219.21 (a)(l-3)); visual resources (36 CFR 219.21(f)); water and watershed conditions (36 CFR 219.23 (a),(b), (c),and (e)); cultural and historic resources (36 CFR 219.24(a) (l-6)); unique biological and geologic areas (36 CFR 219.25); and diversity of plant and animal communities (36 CFR 219.26). Like NFMA, the regulations contain several planning requirements that imply the need for resource inventories: determination of maximum physical and biological production potentials (36 CFR 219.12 (em)); land suitability and assurance of reforestation for timber production (36 CFR 219.14 (a)(l-4)); culmination of mean annual increment of growth of timber species (36 CFR 219.16 (a)(2) (iii)); and sustained yield of timber harvests (36 CFR 219.16(a)(2)(iv)).

Problems With Inventory Data

Although NFMA and the implementing regulations require national forests to base initial and subsequent planning efforts on resource inventories, direction is not provided on how ongoing inventories should be used in planning (137, 238). Some plans refer to inventories in their goals and objectives and monitoring plans, or even include inventory activities as a subcategory in each resource section of their standards and guidelines. Other plans may contain little or no reference to resource inventories, or may list only new inventories that would be required for plan implementation.

A report by the Committee of Scientists reviewing proposed NFMA regulations considered adequate inventory data essential to sound forest plans:

> No plan is better than the resource inventory data that support it. Each forest plan should be based on sound, detailed inventories of soils, vegetation, water resources, wildlife, and the other resources to be managed (48).

Despite the critical role of good inventory data, the committee found that data for most resources in the plans were insufficient for making management decisions.

Nonetheless, the Forest Service has made progress in developing inventories in the 15 years since NFMA was enacted. A current agency handbook provides guidance on resource inventories, and identifies five objectives for Forest Service inventories: 1) determine the condition, production, potential, and amounts of key ecosystem components or processes; 2) identify a benchmark for describing the current physical and biological situation and for forecasting projected changes; 3) provide ecological information as a basis for protection and management decisions about land and resource uses, proposed plans, or actions; 4) consider conditions and trends that either change the demand for resources or that are affected by resource decisions; and 5) refer all inventory information to specific units of land (284).

These general objectives, however, have not ensured that forest planning will address past problems with inventories, such as gaps in information on plants and nongame and invertebrate animals (174, 238, 321). For example, of eight forests examined, only the Eldorado National Forest identified inventories used in initial plan development (137). (See table 6-l.) Even in this case, the data and methods used to conduct the inventories were not identified. Major problems with inventories on the national forests are discussed below in relation to quantity, quality, and timeliness of inventory data, and compliance with NFMA requirements.

Table 6-1--National Forest Plans Sampled for Inventory and Monitoring Reviews

Forest	Region	State	Draft plan	Final plan
Bitterroot	1	Montana	1985	1987
San Juan	2	Colorado	1982	1983
Coconino	3	New Mexico	1985	1987
Dixie	4	Utah	1985	1986
Eldorado	5	California	1986	1989
Siskiyou	6	Oregon	1987	1989
Nantahala and Pisgah	8	North Carolina	1984	1987
Nicolet	9	Wisconsin	1984	1986

SOURCE: L. Krahl, H. Severtson, and H.H. Carey, *The Impacts of NFMA on Resource /inventories and Monitoring on the National Forests*, OTA background paper, Oct. 31, 1990.

Quantity and Quality of Inventory Data

Absence of inventory data is a problem on many forests. Some timber inventories have been based primarily on air photo interpretation. Critics claim they contain little information on growth rates and location of stands, little field reconnaissance, errors in classification of plots, and questionable acreage figures (42). For example, the Cibola National Forest defined and mapped areas based on soil characteristics, potential natural vegetation (PNV), and slope (166). Field data were used for 20 percent of the forest, while the remaining 80 percent was delineated using aerial photos, limited site examination, and extrapolation from existing inventories. Thus, field measurements required for accurate and replicable location of unit boundaries were available for only a small number of areas. Accuracy and replicability could have been improved if more time and funding had been available. Improvements in the next planning cycle are likely because of more extensive survey work being completed on this forest (166).

In other cases, timber data may be inadequate because timber plots from early inventories may not be remeasured to verify growth rates (42). Growth rates for timber stands may simply be predicted by computer programs without field verification (42). Forests also may be classified by site productivity classes rather than present vegetation—a misleading classification system for designating timber stand suitability (42).

As with other resources, inventories on soils and rangeland resources vary in quality and quantity. Some national forests have designed their soil inventories to provide information over large land areas quickly and have relied on air photo interpretation with limited field reconnaissance. Inventories designed in this way require supplemental information for use in high intensity or small area planning projects (42). For example, the Idaho Panhandle National Forests grouped all soils information into four categories (sensitive or nonsensitive soils with slopes over or under 40 percent). The environmental impact statement noted that a greater number of ‘‘specific land types would provide more accurate response units, ’ but that FORPLAN was incapable of handling more types.

Variations in range resource inventories are explained by lack of funding as well as amount of rangeland present on the forest, and thus the priority in forest inventory tasks (166). For example, only a small portion of the Idaho Panhandle forests—about 7500 acres—is managed for domestic grazing (42). The range inventory for these forests, as described in the forest plan, is designed to provide useful information about the range resources. However, the descriptions of range allotments were labeled as “vague and subjective’ (42).

Likewise, the Forest Service has described data on range condition on the Cibola National Forest as ‘‘available but inadequate’ and has criticized past data collection strategies for being based on reports that ‘‘went back several decades and are not consistent with present methodologies” (166, 270).

Data quality in the Cibola forest plan generally has been poor (166). The Cibola forest planners stated that it is not Forest Service policy to do resource inventories specifically for land management planning. Rather, the forest relies on compiling a database for the plans by extrapolating and disaggregating data collected for other management purposes. The forest is, however, now developing two data sets based on field inventories. One, for timber, examines all commercial timber stands. The second is a terrestrial ecosystem survey examining soil characteristics, potential natural vegetation, and slope. The forest is also working on implementing a geographic information system in anticipation of markedly improved data.

Timeliness of Inventory Data

Delays in forest plan completion may lead to as much as a 10- to 15-year gap between the date the data were collected and publication of the plan (137). Six of the forests in table 6-1 used timber inventories that were at least 5 years old when the draft plans were released. The timber inventory was up to 8 years old in the draft plan for the Siskiyou and 15 years old in the draft plan for the San Juan.

Additional problems exist with respect to timeliness of data collection. Forest Service planning rules adopted in 1979 stated that”. . . existing data will be used in planning unless such data is [sic] inadequate” (36 CFR 219.5). Forest Service Manual provisions issued in March 1980 added to this rule:

> Where additional data and information collection is necessary, it must be limited to that which is essential for analysis and decisionmaking in the planning process *(267).*

Under direction of the Chief of the Forest Service to rely substantially on existing data, some forests postponed new inventories, and used existing data that were not comprehensive enough to aid planning and management decisions (42). Although the 1982 revision of the forest planning rules eliminated the statement that "existing data will be used," by that time, some forests were committed to using existing data in preparing their plans (42).

Compliance With Inventory Requirements

Several plans from forests in table 6-1 failed to comply with inventory requirements in NFMA. One of the critical requirements is the inventory of roadless areas. Only one (the Bitterroot) provided for an annual inventory of roadless areas and changes in wilderness characteristics. Staff on the other forests stated that, although they did not have systematic inventories of wilderness characteristics in roadless areas, they did include assessments of these characteristics in the National Environmental Policy Act (NEPA) documentation for proposed projects in the wilderness areas (137). The forest staff stated that the inventory conducted under the second roadless area review and evaluation (RARE II) was sufficient, and that project-specific assessments were adequate to maintain the inventory (137).

The sufficiency of the RARE II inventories has been questioned, however. In ***California v. Block (690*** F. **2d 753, 9th Cir. 1982), the court held that RARE II failed to meet the** NEPA requirements for site-specific evaluation of the consequences of recommending that areas be available for non-wilderness management. This ruling required forest planners to reevaluate RARE II roadless areas for wilderness. For the Idaho Panhandle National Forests, the Forest Service stated that the analysis of roadless areas had a substantial effect on the outcome of the plan (282). However, one critic claimed that the analysis had little effect on the forest plan because many distinguishing attributes of the forests' roadless areas were not identified in FORPLAN (42).

Only two of the plans from the eight forests in table 6-1 (Siskiyou and Coconino) prescribed inventories for threatened fish habitats, and none identified inventories of waters threatened by timber harvests (137). Interviews with forest staff suggested that, although the inventories were not prescribed in the plans, conditions of aquatic resources are inventoried, especially within project areas.

Summary and Conclusion

The poor quality of national forest resource inventories, the lack of coordination among various resource-specific inventories, and the inappropriate use of information in decisionmaking contributed to the enactment of NFMA (137). The situation on the forests since NFMA was enacted has not changed substantially. Absence of data along with poor data quality, limited collection of new data, out-of-date information, and failure to comply with the law are inherent in many of the resource inventories of the forest plans. These problems are magnified by data that are poorly documented and inaccessible. Some forests have not set up a well-organized, easy-to-access data system that the public could use to obtain background information on resource inventory or even to know what inventories are maintained. Few forests summarize their resource inventories in a document that is appropriate for reading by the general public (238).

A critical first step in the planning process is to identify key resource management decisions and define data needs. The Forest Service, in trying to make management decisions based on limited data, must examine available knowledge, combine it with expert opinion, and make predictions about the consequences of alternative management actions (247). While the national forests rarely have all the information that might be desirable to make a management decision, and certainly are in need of more and better data to assist in management decisions, it is important that the existing data are accessible and applied to appropriate management situations. Major roadblocks-an emphasis on timber inventory as well as little funding-have limited the scope of resource inventories. Priorities can be set by identifying significant gaps in resource data. New inventories can be designed to provide missing information, with special and unusual data needs met with additional surveys and inventories. Inventory data that do exist must provide baseline information for identifying and examining impacts of activities conducted on the forests. The inventory data must be organized and presented in a meaningful, usable form that can be aggregated for a broader picture of the Nation's resources.

RESOURCE MONITORING

Monitoring Requirements in NFMA and the Regulations[4]

In contrast to its inventory requirements, NFMA contains no general provision requiring monitoring. The word ''monitoring' appears only once, in reference to research and evaluation of the effects of management systems (section 6(g)(3)(C)). The need for monitoring is inferred in requirements for reforestation (section 3(d)(l)), herbicide and pesticide use (section 3(e)), revegetation of temporary roads (section IO(b)), and implementation of even-aged harvest (section 6(g)(3)(f)(v)).

Unlike the law, the regulations highlight monitoring as a critical component of forest planning. The regulations require monitoring plans as part of the land and resource management plan for each national forest. Implementation of these monitoring plans must be reviewed periodically to determine if the prescribed monitoring is occurring as well as if the resources are being managed sustainably.

> At intervals established in the plan, implementation shall be evaluated on a sample basis to determine how well objectives have been met and how closely management standards and guidelines have been applied. Based upon this evaluation, the interdisciplinary team shall recommend to the Forest Supervisor such changes in management direction, revisions, or amendments to the forest plan as are deemed necessary (36 CFR 219.12(k)).

Additionally, the regulations imply that monitoring must be conducted to assess the impact of timber harvests on soil, water, fish, wildlife, recreation, and aesthetic resources (36 CFR 2 19.27(c)(6)). Monitoring to preserve and enhance the diversity of plant and animal communities is also implied in regulatory requirements for diversity ''at least as great as that which would be expected in a natural forest" (36 CFR 219.27(g)). The regulations require that monitoring include: quantitative outputs and services and costs of management prescriptions (36 CFR 219.12 (k)(l)and(3)); documentation of measured prescriptions and effects, including significant changes in productivity of the land (36 CFR 219.12(k)(2)); and a description of actions, effects, or resources measured, the frequency of measurements, the expected precision and reliability of the monitoring process, **and the** time when evaluation will be reported (36 CFR 219.12 (k)(4) (i-iii)).

The monitoring requirements in NFMA and the regulations reinforced some existing Forest Service activities. Measuring and reporting outputs and monitoring project implementation had been conducted on the national forests for many years. NFMA and the regulations augmented these procedures by requiring the forests to: 1) specify standards and guidelines for monitoring project implementation; and 2) monitor environmental impacts, a practice that had not been common, especially for noncommodity resources. NFMA also requires that forest plans be revised when conditions have changed significantly, but at least every 15 years (section 6(f)(5)(A)). This implicitly requires that forest plan implementation and forest conditions be monitored, to determine when significant changes have occurred. The regulations further require forest supervisors to "review the conditions on the land covered by the plan at least every 5 years to determine whether conditions or demands of the public have changed significantly" (36 CFR 219.10(g)). If the supervisor finds significant changes, the plan must be revised.

Problems With Monitoring Activities

Compliance With Monitoring Requirements

Monitoring measures the results of resource management activities to ensure that prescribed activities are undertaken and that they have the expected effects. The regulatory requirements for reports on monitoring are not always fulfilled. Although five of the forests in table 6-1 (Bitterroot, Coconino, Nantahala/Pisgah, Nicolet and San Juan) have issued monitoring reports, only the Bitterroot has issued annual monitoring reports according to the schedule in its plan (137). The Dixie completed its plan in 1986 and the Eldorado and Siskiyou completed their plans in 1989. These forests may release monitoring reports by the end of 1991.

Although all of the plans in table 6-1 prescribed monitoring activities to measure product and service outputs, they were less consistent in prescribing monitoring to assess noncommodity resources (137). Only two plans (Dixie and Siskiyou) prescribed monitoring to meet all of the noncommodity goals and objectives in their forest plans. Three plans

[4]Based largely on Krahl et al. 1990 (137).

(Bitterroot, Coconino, and the Nantahala/Pisgah) prescribed monitoring for at least 75 percent of their noncommodity goals and objectives, while the remaining three plans (Eldorado, Nicolet and San Juan) prescribed monitoring for less than 65 percent of their noncommodity goals and objectives (137). In addition, despite the requirement to submit an annual report on the amounts, types, uses, and beneficial or adverse effects of herbicides and pesticides, none of the eight plans in table 6-1 included this information. Even though this information was not in the plans, staff from these forests stated that they report herbicide and pesticide use, in compliance with regional or State requirements (137).

Levels of Monitoring

The Forest Service defines monitoring at three different levels: 1) implementation monitoring, or an evaluation of whether management activities are carried out according to the forest plan; 2) effectiveness monitoring, or an evaluation of whether the management activities meet the plan objectives; and 3) validation monitoring, or an evaluation of whether the initial plan assumptions are correct (267). (See box 6-A.) To date, complaints with implementation monitoring have been the most common, but problems with all three levels of monitoring have led to criticism of the management plans.

Implementation monitoring poses the question: "Did the Forest Service do what they said they would do?' Many monitoring programs have been criticized for promising too much (42, 248). For example, personnel needs in the Chequamegon National Forest's monitoring plan for the next 6 years (1990 to 1996) call for an increase of 95 percent in the number of work days over that of 1989—an unlikely scenario (238). As implied in the plan, however, the proposed increase would considerably enlarge the scope of the monitoring program and provide the forest with greater knowledge of the condition of its resources.[5]

The Idaho Panhandle monitoring plan has been criticized for uneven monitoring-items that are easy to quantify, like the size of timber cutting units, were successfully monitored, while items less easily quantified, e.g., wildlife and fish population trends, were less successfully monitored. Some items were not monitored at all (e.g., the status of certain wildlife species and effects of management on insects and disease) (42).

Effectiveness monitoring poses the question: "Did the Forest Service accomplish what they set out to do, and did they do it in the most efficient way?" The forest plans have been criticized for inaccurate reporting of resource conditions. An audit by the Idaho State Department of Lands found that some timber sales on the Idaho Panhandle had unacceptable implementation of best management practices (BMPs). In 1989, the forest began a program to determine if the BMPs were successful in meeting State water quality requirements. At least four of the planned watershed monitoring programs were not completed due to lack of funding and personnel (42).

Validation monitoring poses the question: "Are the Forest Service goals and objectives appropriate?" Regardless of specific monitoring programs developed by the Forest Service, the programs must

Box 6-A—Example of Levels of Monitoring on a National Forest[1]

Forest Plan Goal: To maintain stream temperature by keeping 10 percent of Moose Creek in shade and thereby maintain trout populations in Moose Creek.

Forest Plan Standard and Guideline: Do not remove any trees within 15 feet of a stream.

Implementation Monitoring: Did the forest do what they said they would do? Did the forest remove any trees within 15 feet of the stream?

Effectiveness Monitoring: **Did the Forest Service accomplish what they set out to do, and did they do it in the most efficient way? Can the trout populations in Moose Creek be maintained by not removing any trees within 15 feet of the stream?**

Validation Monitoring: Are the Forest Service goals and objectives appropriate? Does maintaining 10 percent of Moose Creek in the shade keep temperatures from rising above the limit for maintaining trout populations?

[1]Information adapted from Handout 11.13, Unit 11, **Monitoring and Evaluation of the Forest Plan Implementation Course 1900-01.**

[5]The forest has been increasing spending related to forest plan monitoring, going from $0 specifically allocated to forest plan monitoring in fiscal year 1988 to over $50,000 in fiscal year 1991 (letter from Forest Service to OTA, Aug. 20, 1991).

be defendable in terms of rigorous study design and analysis (174). If, as is often the case, the forests have not carried out the proposed monitoring activities it is difficult to evaluate this question. Thus, investigations of Forest Service monitoring cannot evaluate the appropriateness of Forest Service goals and objectives because there are few data to analyze and defend.

Summary and Conclusion

Monitoring on the national forests involves the repeated inventory of managed resources to determine conditions and trends. Because the Forest Service is directed to maintain a comprehensive survey and analysis of conditions of renewable resources under its jurisdiction (section 3(b)), the focus of this section of the law is really monitoring rather than point-in-time inventory (174). It is still early to determine whether the Forest Service has successfully met its monitoring requirements—some of the forests have not yet issued monitoring reports. The monitoring the Forest Service has scheduled, however, often has not been implemented. The forests have typically promised more than they have been able to deliver.

One way of reducing measures of ecosystem health to a manageable level is to review the relevance of the chosen measures to human concerns (127). Important characteristics to include in an inventory and monitoring program relate directly or indirectly to something that people are concerned about. Identifying these characteristics may require an explanation of why the measure is relevant.

Newly proposed regulations (287) may strengthen the role of monitoring in the planning process. The agency may place renewed emphasis on integrated, multiresource programs and an ecosystems approach. Given the lack of money for detailed monitoring, however, the forests need to reevaluate their monitoring plans. The plans must reflect more accurately what is possible and what is most important to accomplish under staff and budget constraints and according to public interest.

SPECIAL ISSUES

Biological Modeling

Environmental planning requirements of NFMA are varied and extensive. In fact, the data required from the Forest Service by law 'are far beyond those ever compiled by the Forest Service or anyone else . . .' (51) Historically, most forests have lacked data useful to forest planning, including reliable data on tree growth and yield (particularly for regenerated stands in plantations) and up-to-date vegetation maps (64). Forestry research also had not provided much support in the way of practical biological models for forest planning (64). After NFMA, the overwhelming task facing forest planners was to come up with reliable, desirable plans for large, complex, million-acre areas-a task requiring a lot of data, time, money, and a skilled workforce. Not enough of any of this was provided to the agency to accomplish the tasks required in NFMA (64).

As abstractions and simplifications of reality, biological models depict relationships among environmental factors (174). Models represent a theoretical framework for understanding the environment. Simplification is necessary in model development, to describe complex systems in comprehensible ways. The extent and form of the simplification are critical, because if the simplification is not appropriate, management decisions based on the model will be faulty (174). Inappropriate simplification of models has resulted from poor quality data, data that emphasize the timber resource, and failure to recognize the importance of scale in study design.

Data Problems

Despite RPA/NFMA requirements for integrated, multiresource inventories, Forest Service inventory and monitoring have failed to support models depicting resource interplay within a complex environment (174). The historic emphasis on timber in Forest Service management has led to inventory data that fit into models for timber production forecasting. Forest models developed for FORPLAN emphasize the growth, manipulation, and harvest of trees (64). (See also ch. 7.) FORPLAN's emphasis on timber management reflects both the design of FORPLAN and the lack of reliable theory and data to quantify nontree outputs. Except for timber assessments, "Land managers have had to rely on intuitive judgment rather than the evaluation of systematically organized data sets and processes' (135). FORPLAN directly or indirectly links outputs such as forage, water, sediment, recreation, fish, visual quality, and wildlife habitat to forest management through land allocations and restrictions on timber production (64). For example, FORPLAN rarely contains a reliable, well-documented, quanti-

tative yield table to represent nontimber outputs and how they respond to use and development. In many cases, the existing inventories emphasizing timber are now driving model development, rather than the models driving data collection by generating hypotheses that determine critical variables and appropriate sampling designs (174).

Wildlife managers are especially challenged to provide sufficient and reliable data on nongame species, which are essentially new to the inventory (304). Models have been developed to estimate effects of forestry activities on these species and to forecast trends in abundance. However, many wildlife population models have been developed on assumptions about habitat suitability that may not be valid (304). For example, one common assumption is that species abundance can be used as an index to habitat suitability. Challenges to this assumption suggest that indices based on demographic parameters (e.g., clutch size or growth rate) may prove to be more reliable than indices based on abundance (96, 302). Another common assumption in wildlife population models is that populations change in proportion to the availability of suitable habitat (304). However, animal numbers may beheld below carrying capacity by other factors, including predation, parasitism, competition, weather extremes, and unpredictable events.

Even if wildlife population models are correct in assuming that abundance may be a good measure of habitat suitability, critics claim that the available data are still insufficient to draw conclusions for guiding management activities (304):

> Existing inventory techniques are generally too expensive and they require more skilled personnel than are available . . . To date, no comprehensive system for monitoring wildlife resources on a major land-management unit has been developed and tested . . .

Questions have also been raised regarding logistical procedures for updating files that are used to build biological models. Verner (304) claimed that efforts to update inventories on national forests "have been marginally successful because of cost and lack of suitable computerized data files."

Scale Problems

Use of appropriate scale is also a problem in the modeling of biological systems for the national forests. The characteristics of ecological systems differ at different scales. For example, small plots surveyed for bird species may show that two species are found in different habitats, perhaps in forests of different age classes. When surveying at a broader scale, the two species may be associated together rather than with other species that occur in more distinct habitats, such as cattail marshes or sedge meadows. Thus, inventory results would vary depending on the scale of survey.

> [I]f we study a system at an inappropriate scale, we may not detect its actual dynamics and patterns but may instead identify patterns that are artifacts of scale (319).

Each forest is unique at the continental scale, since major environmental factors such as geologic features, temperature, and precipitation vary throughout the country (172). Each forest is also unique, however, at the local level, where topography, geology, and history influence conditions. It is important that management decisions recognize the appropriate scale of influence and impact of management activities. Section 6(b) of NFMA requires that a systematic interdisciplinary approach, including economic and environmental considerations, be used to evaluate management alternatives. This implies that the plans will show interactions among the managed resources. Shugart and Gilbert (234) conclude that:

> One might argue that the Forest Service should not be trying to do such comprehensive planning forest-wide, and yet the National Forest Management Act states that a single plan must be produced.

One approach to improve the usefulness of biological models in forest planning is to treat models as tools rather than goals:

> The goal is to apply research findings usefully to predict management effects. . . The model is but one tool to reach the goal (36),

Management is, in many respects, an experiment in applying models to the real world. Results are monitored to evaluate and improve the models (146). Development of multiple-resource models with linkages to a geographic information system are described as particularly promising for integrated analysis at various scales (146). GIS can provide information on resources with site specificity in an accessible format and assist in the evaluation of results from the models and in the estimations of environmental effects (278).

Biological Diversity

Legal Requirements

Biological diversity refers to the variety and relative frequency of living organisms (174). Ecosystem interactions are integral components of biological diversity, and biological diversity, in turn, determines ecosystem interactions. Morrison (174) offered the following analogy for understanding the relationship between biodiversity (biological components of the ecosystem) and ecosystem functioning:

> You can count all the parts of a vehicle and assess their condition individually without being assured that the assembled vehicle will start, or how well it will run over the long term. The fewer parts you inventory and monitor, the less likely you will be to predict whether the finished product is complete and how it will function.

NFMA directly refers to maintaining biological diversity in the land and resource management plans. Section 6(g)(3)(B) states that the regulations for developing the plans are to:

> . . . provide for diversity of plant and animal communities based on the suitability and capability of the specific land area in order to meet overall multiple-use objectives . . .

The Committee of Scientists interpreted this as clear congressional intent for considering diversity throughout the planning process and for maintaining or increasing the diversity of plant and animal species and of biological communities (48).

The Forest Service regulations repeat and expand on NFMA's guidance to provide for diversity of plant and animal communities in the forest plans:

> Forest planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices (36 CFR 219.26).

The regulations also limit the loss of diversity to be tolerated under prescribed management practices (36 CFR 219.27(g)) and recognize that national forests are ecosystems and that their management requires awareness of the interrelationships among resources (36 CFR 219.1(b)(3)). The regulations specify biological diversity as a criterion for evaluating lands as potential wilderness areas (36 CFR 219.17(a)(2)(v)).

In addition to the requirement to inventory and monitor the diversity of plant and animal communities, Forest Service regulations require the forests to maintain viable populations of species:

> Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area (36 CFR 219.90).

A viable population is defined as 'one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area" (36 CFR 219.9). A Department of Agriculture regulating extends the requirement beyond vertebrates, to maintain at least viable populations of "all existing native and desired non-native plants, fish, and wildlife species" (321). Population viability is one part of biodiversity, since diversity clearly declines when species go extinct (174). Thus, inventory and monitoring for diversity must estimate the numbers of organisms as well as assess the relationship between the numbers and population viability (174).

Wilcove (321) argued that forest plans have failed to address the issue of conservation of biological diversity adequately. The current approach tends to increase populations of widespread species at the expense of rarer species, because each national forest can assure viable populations for common species but not for uncommon species. In contrast, a regional approach considering all landowners could better fulfill the intent of preserving biological diversity in all natural ecosystems (321).

The inadequate treatment of biological diversity has been blamed, at least in part, on the failure to identify measurable attributes of diversity for inventory and monitoring programs (184). Ness (184) outlined a characterization of biodiversity that identified three biological components--composi-

[6]U.S. Department of Agriculture, Departmental Regulation 9500-4, Fish and Wildlife Policy, Aug. 22, 1983.

tion, structure, and function--for four levels of diversity-regional, community, population, and genetic. Others have also called for conservation of biological diversity using a more comprehensive, landscape-level approach (107, 318).

Diversity in NFMA Planning

Although NFMA requires the national forests to inventory diversity, neither the law nor the regulations specify the kinds of data needed to create such inventories. Forest plans, therefore, vary in the data they consider in their evaluation of diversity (238).

A review of 20 national forest plans showed that most of the forests specified the level of diversity, stated the diversity level in terms of overall multiple-use objectives, discussed the consequences of the diversity level provided, and justified the reductions in existing diversity in terms of multiple-use objectives (167). Management prescriptions to provide for diversity of the natural forest, however, were not identified by any of the forests and only one compared diversity of past and present conditions. Also missing were quantitative measures of the distribution and abundance of plant and animal species. Most forests (60 percent) used the percent of total forest acreage in different age classes as a surrogate measure of animal diversity. Seven forests (35 percent) measured diversity as the percent change in forestwide habitat capability for management indicator species. Specific measures of plant diversity were not included, under the assumption that animal (habitat) diversity reflects vegetative diversity (167). (See also the following discussion of indicator species.) The study concluded that although the 20 forests generally conformed with NFMA requirements to provide for diversity and show effects of outputs on diversity, the measures of diversity were general values for tree age classes or animal numbers, rather than specific measures for plant and animal communities and species distribution and abundance. These measures were also insensitive to effects of different management options on diversity (167).

Timber and range vegetation types are the most common measures of diversity in these plans of forests listed in table 6-1. The Bitterroot, Eldorado, and San Juan Forests included old-growth forest, but surprisingly, the Siskiyou did not--even though old-growth forest protection has been an issue in that region. Six of the forests (Coconino, Eldorado, San Juan, Siskiyou, Nantahala/Pisgah, and Nicolet) included wildlife habitat measures in their inventories of diversity. All of these measures of diversity, however, fail to adequately evaluate spatial, temporal, and structural characteristics of biological diversity (137). Three of the forests have developed special inventories to address these shortfalls. The Eldorado National Forest greatly expanded its plant inventories; the Siskiyou participated in a regional inventory of vegetative communities that will include measures of fragmentation and biological corridors; and the Nantahala/Pisgah, in response to a successful administrative appeal based on the inadequacy of the diversity section of the forest plan, is evaluating alternative inventory methods to determine status and trend of diversity (137).

To compile information on diversity, the Chequamegon National Forest staff used data from the Wisconsin Department of Natural Resources on vertebrate species, selected sensitive and game vertebrate species, rare vascular plants, and potential research natural areas. The forest also used general vegetation information from its Vegetation Management Information System (238). These data, like the biological diversity data collected on other forests, are incomplete in that no species list was available for invertebrate animals and no information was available for nonvascular plants, lichens, and fungi. The Chequamegon Forest has taken steps to resolve some of these problems by enlarging the scope of diversity information and by focusing monitoring efforts on species and processes of greatest public concern or those most affected by forest management. Examples of programs to be added include monitoring the reproduction of white cedar and the use of various plant foods by mammals (238).

Several plans have been criticized for promoting management practices that do not protect the biological resources of the National Forest System: forests are being converted to monoculture, genetic diversity is not being enhanced, and animal habitats are being fragmented (321). Plans from national forests in Florida, for example, promote management practices that will convert longleaf pine forests into stands of species that would not occur there naturally. The final plan for the Ouachita National Forest, in Arkansas and Oklahoma, was criticized for managing almost solely for pine forests and for decreasing genetic diversity by artificially regenerating clearcut stands with pine. Restrictions on clearcutting and pine plantations were considered for this area in the Winding Stair Mountain National

Recreation and Wilderness Area Act.[7] However, only an annual timber management report and an advisory coremittee were finally specified in the act. The plans for the Arapaho/Roosevelt and Shoshone National Forests (in Colorado and Wyoming, respectively) were criticized because they would allow a high level of forest fragmentation. Biological diversity would not be protected (321).

Indicators

General Indicator Concept

An indicator has been defined as:

> A characteristic of the environment that, when measured, quantifies the magnitude of stress, habitat characteristics, degree of exposure to the stressor, or degree of ecological response to the exposure.[8]

Indicators have been used as an index of conditions that are too difficult, inconvenient, or expensive to measure directly (140). Indicators can streamline investigations of environmental conditions by minimizing the number of characteristics that need to be measured. Indicators may be of several kinds. Some may be ecological in that they provide information on the biological condition of a resource. Others may be stressor indicators, providing information on environmental hazards, or management indicators, providing information on management activities.

While saving time and money, the indicator concept has been criticized for presenting an oversimplified view of environmental conditions. Indicator species, in particular--in contrast to the broader indicator concept that can include characteristics such as climatic fluctuations or levels of nutrients in tree foliage in addition to individual species—have been described as misleading:

> Indicator species often have told us little about overall environmental trends, and may even have deluded us into thinking that all is well with an environment simply because an indicator is thriving (184).

A poor selection process for indicator species could lead to poor assumptions about the effects of an environmental hazard, such as a chemical pollutant. For example, **assumin g that a** chosen indicator species will decline if the chemical pollutant is harmful **to its** food source may not be effective if the chosen indicator does not depend solely on that food source. Declines in other species that do rely solely on the affected food source might go unnoticed because these species were not monitored.

Recommendations to make the use of indicators more rigorous include: a clear statement of goals; thorough biological knowledge of the indicator; and peer review of assessment design, methods of data collection, statistical analysis, interpretations, and recommendations (140). The most useful indicators will be sensitive to stress, responding to it rapidly in a predictable way; be easy and economical to measure; and be relevant to the goals of the investigation (127). A set of carefully selected indicators, rather than a single indicator species, is more likely to exhibit all of the characteristics recommended as selection criteria (184).

Forest Service Use of Management Indicator Species

Forest Service regulations require the forests to select and monitor a set of management indicator species (MIS) (36 CFR 219.9). The Forest Service regulations list five categories to be represented when selecting MIS: 1) endangered or threatened species identified at the State or Federal level; 2) species sensitive to planned management activities; 3) game and commercial species; 4) nongame species of special interest; and 5) ecological indicator species that are used to monitor the effects of management practices on other species. Following the general indicator concept, the MIS chosen to represent these categories act as surrogates for measuring environmental conditions of the forest communities. Management indicator species differ from other types of indicators in that: 1) they are species (in contrast to characteristics); 2) they indicate the effects of management activities (in contrast to effects of other events such as natural disasters or changes in rainfall); and 3) they indicate the effects of management activities on forest resources (not solely on other species). The use of MIS assumes that some relationship exists between a prescribed management activity and the presence or abundance of the MIS (174, 189).

As with the indicator concept itself, several major problems confront the use of MIS: guidelines have

[7] Act of Oct. 18, 1989, Public Law 100-499 (102 Stat. 2491).

[8] U.S. Environmental Protection Agency, "Environmental Monitoring and Assessment Program, Ecological Indicators," Office of Research and Development Washington DC, September 1990.

not been set for the selection of species; training and expertise to select, monitor, and analyze MIS have been lacking; and some species are ignored in the inventory process (174, 189). With no guidelines for the selection of MIS, selection processes vary among forests. Some are criticized for choosing an insufficient number of indicators, others for choosing indicators that are not related to ecosystem conditions. The following examples illustrate specific problems some forests have had with the use of MIS.

The Idaho Panhandle National Forests and the Cibola National Forest fell short in their selection of an adequate number of indicators and their collection of data on chosen indicators (42, 166). On the Idaho Panhandle, no indicator species existed for mature lodgepole pine which covers a major part of these forests. Also on the Idaho Panhandle, no data were available on populations or population trends for most of the nongame indicator species (marten, pileated woodpecker, and goshawks) (42). On the Cibola, inventory data were also nonexistent for population size and distribution of nongame indicator species (166).

The Chequamegon National Forest plan recognized 25 ecological community types, but only identified 15 indicator species to evaluate conditions in these communities. Deciduous trees dominate at least half of this forest, but the stands were lumped into two classes: young/mature hardwoods with ruffed grouse as an indicator, and old-growth hardwoods with the pileated woodpecker as an indicator. Under this classification, several communities (a young, even-aged stand of red oak and red maple, an uneven-aged pure stand of sugar maple, and a mixed stand of basswood and yellow birch) would all be lumped into one category. Tracking populations of ruffed grouse and pileated woodpeckers would poorly represent changes in these communities or in their other constituent species (238).

Also in the Chequamegon plan, two species were selected as aquatic indicators, but were dropped from the list because ''little management of aquatic habitats is planned for this decade" (238). Thus the potential effects of such management activities as timber harvesting or road construction on aquatic ecosystems are ignored. In addition, one of the chosen indicator species did not depend on natural conditions for reproduction in the forest. The muskellunge, a game fish stocked in the lakes and streams in the Chequamegon National Forest by the Wisconsin Department of Natural Resources, was chosen as the sole "ecological" indicator for warm water habitats in the forest. But because of artificial stocking, muskie population numbers are inaccurate indicators of the effects of national forest management (238).

A review of 104 draft and final plans for 118 national forests showed that the majority failed to choose a wide spectrum of indicator species and overlooked the advantages of selecting plants and some invertebrates:

> Ninety-three plans did not have any plants on their MIS lists, other than species already listed as threatened or endangered by the federal government. Eighty-seven did not include any unlisted invertebrate animals, despite the fact that invertebrate animals constitute the vast majority of living species. Of the 1,439 MIS in these plans (excluding federal threatened and endangered species), 50 percent were birds, 27 percent were mammals, 17 percent were fishes, two percent were reptiles and amphibians, less than one percent were invertebrates, two percent were plants, and two percent were multi-species assemblages of birds, plants, fishes, or invertebrates (321).

Thus, while birds and mammals can serve as good ecological indicators for other species with smaller area requirements, an MIS list composed only of vertebrate animals will be inadequate for protecting all rare plants or invertebrate animals in a given area (321).

Indicator Species and a Monitoring Program

The selection of appropriate management indicator species must be combined with an adequate monitoring program. The Forest Service regulations state that:

> Population trends of the management indicator species will be monitored and relationships to habitat changes determined (36 CFR 219.19(a)(6)).

The goal of monitoring MIS on the national forests is to verify assumptions in the forest plans about effects of management activities on ecosystem health. Monitoring MIS can lead to needed changes in management activities. Three important components of a successful monitoring program include: 1) a scientifically sound method for assessing populations of the MIS in question; 2) a reasonable frequency of measurement; and 3) a standard for population levels or degrees of change in population

size, density, or distribution that triggers a reanalysis of management activities.

Monitoring programs in many forest plans do not meet these standards (32 1). Some plans propose only to monitor habitats rather than populations, while others call for only infrequent monitoring of the MIS—populations may be counted only once every 5 or sometimes 10 years. This infrequent monitoring will only detect the most drastic population changes and will not alert the forest in time to avert or alter destructive management activities.

Summary and Conclusions

Forest planning under NFMA requires a tremendous database accompanied by time, money, and trained staff. Emphasis on timber management and the lack of data on nontree outputs has hindered the development of thorough and accurate biological models to assist forest planning. Questions have been raised on the validity of assumptions, the adequacy of updating and maintaining data files, and the use of appropriate scale. Future models to aid planners in forest resource management must take advantage of new technologies in data collection, storage, and updating and must pay closer attention to scale of analysis as well as to more comprehensive, integrated analysis of renewable resources.

NFMA and the forest planning regulations make repeated reference to maintaining biological diversity in the **national forests. Treatment of this issue in the plans, however, has not received favorable reviews. The Forest Service lacks adequate inventory data to address diversity questions, and critics assert that the agency has a short-term, myopic view of conservation of biological diversity rather than a long-term, comprehensive approach.**

Problems with the use of management indicator species make this requirement subject to varied interpretations and criticisms. It is not economically feasible to study all species on a forest; the MIS concept offers a less costly alternative to tracking environmental trends. Application of the MIS concept to the national forests, however, has been described as neither efficient nor effective. Continued use of indicators on the forests should involve an effort to improve the selection process as well as a more comprehensive approach to evaluating the forest ecosystem. This comprehensive approach should include analysis of management indicators as well as indicators of habitat conditions and ecological processes. The national forests may have numerous chances to revise and expand the characteristics chosen as indicators, but interest in collecting information for determining long-term trends discourages this from happening often. It is important that the forests select an adequate number of indicators that will provide the maximum amount of information with reasonable monitoring ease.

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Chapter 7

Technologies for National Forest Planning

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Chapter 7
Technologies for National Forest Planning

The National Forest Management Act of 1976 (NFMA) does not explicitly require the use of any particular technologies in preparing and revising forest plans. However, NFMA establishes various resource quality standards, and specifies various considerations for the planning process. While a variety of techniques are available for organizing and analyzing information to meet these requirements, the Forest Service chose one particular computer model—FORPLAN--as the principal analytical tool for forest planning.

FORPLAN is a complex and expensive computer program. Some have blamed FORPLAN for a costly and time-consuming planning process, and have asserted that FORPLAN has increased the controversy over national forest management. Congress asked OTA to assess Forest Service planning partly to determine if FORPLAN has helped or hindered the process. This chapter briefly examines planning technologies that exist, reviews the development of FORPLAN, and discusses FORPLAN's strengths and weaknesses for supporting the forest planning process.

RELEVANT PLANNING DECISIONS

To assess the planning technologies, it is necessary to understand the decisions to be made in the planning process. As discussed earlier in this report, the purpose of national forest management is to accommodate uses and produce outputs while sustaining ecosystems. (See ch. 3.) Thus, technologies that can allocate (analyze spatially) and/or schedule (analyze temporally) could be useful in decisionmaking, while technologies that assess the effects of decisions on ecosystems and values could be useful in understanding the consequences of decisions.

Because of the concerns over clearcutting in the early 1970s, NFMA focused on protecting the forest environment during timber harvesting (123). (See ch. 4.) NFMA included two particular provisions that lend themselves well to computer analysis. The first, section 6(k), prohibits most timber harvesting from lands identified as not suited for timber production, "considering physical, economic, and other pertinent factors to the extent feasible, as determined by the Secretary." In essence, this provision requires a land allocation decision, based in part on an economic (temporal) analysis of timber production.

The second provision, section 13(a), generally limits timber sales (the allowable sale quantity, or ASQ) to a level that can be sustained in perpetuity; this requirement is commonly known as nondeclining even flow (NDEF). Assuring that the plans provide this perpetual, sustainable flow is a long-term scheduling problem, based in part on the land allocation decision under section 6(k).[1] The long timeframe for managing timber makes both the allocation and scheduling decisions well suited for analysis using computer technology.

These provisions of NFMA limit timber harvesting based on certain specified criteria. The Multiple-Use Sustained-Yield Act (MUSYA) and NFMA further require that timber harvesting be coordinated with other uses. Decisions coordinated to allocate and schedule the various uses and outputs are one means to minimize conflicts and to accommodate compatible activities. Again, computer models can be useful in analyzing the allocation and scheduling decisions for timber production as well as other uses and outputs.

The various legal requirements of MUSYA and NFMA imply a sequential analysis. Lands suitable for timber production are identified, the ASQ is determined, and finally timber management is coordinated with other uses and outputs. Notably, both sections 6(k) and 13(a) provide exceptions to their limitations on timber harvesting based on multiple-use considerations. Thus, arguably timberland suitability and ASQ are to be determined without limitations based on multiple-use coordination (293). However, Forest Service practices make these three analyses (timberland suitability, ASQ determina-

[1]Some observers have noted that current techniques and the cyclical Forest Service planning process could lead to declines in the ASQ in each subsequent plan for a national forest, contrary to the intent of nondefining even flow in NFMA (163). Such an occurrence can apparently be made insignificant with additional restrictions on the current models (134), and thus this difficulty is not considered in this Assessment. However, further analysis of this possibility by the agency maybe warranted.

tions, and multiple-use coordination) simultaneously. The regulations for implementing section 6(k) specifically include multiple-use benefits for determining the suitability of lands for producing timber. By including multiple-use benefits in determining timberland suitability, multiple-use considerations also have been included in determining the ASQ. Thus, the Forest Service has chosen to combine timberland suitability, ASQ determi nation, and multiple-use coordination in one large, allocation and scheduling problem.

TYPES OF PLANNING TECHNOLOGIES

Two types of computer modeling are useful for analyzing alternative plans. One approach—simulation—imitates the relevant system, and is used to examine how important measures change when the decisions or inputs change. The other--optimization--attempts to maximize or minimize important measures within the system's limits. Optimization models are often preferred for supporting decisionmaking, but may not be relevant if one cannot define all the variables that should be optimized. Furthermore, because optimization models (and the calculations they require) are often much more complex than simulations, they can be very expensive to use.

It is important to note that computer models are not perfect duplicates of the real world. Reality is generally too complex to replicate precisely. Thus, models necessarily simplify the real world. Nonetheless, the results of useful models must approximate the actual results of management actions. Models are tested (verified, in technical parlance) to determine if their results are sufficiently similar to reality to make the model useful. Computer model results, however, are still only estimates of what will happen. This, together with the human responsibility for decisions, is why computer models are used to support decisionmaking, rather than to make decisions.

Computer tools contribute to forest planning in two ways—by assisting in allocation and scheduling decisions and by assisting in estimating the consequences of decisions. Additional techniques can be used to supplement and coordinate the technologies that contribute to allocation and scheduling decisions and that estimate impacts.

Decision Support Technologies

Resource Scheduling Decisions

Resource scheduling decisions determine the levels of uses and outputs that will occur over time. Most scheduling tools used in business are optimization models, determining the 'best' (typically most profitable) timing for activities within the constraints of the systems. Common scheduling models include inventory models for reordering decisions, transportation models for the delivery of goods, and models for determining the optimum mix of outputs from a common input. These latter two models both use linear programming, a tool that achieves an objective function within the constraints of the system. For example, linear programming is used in determining the output mix in the refining of crude oil: the output of the model (the solution) identifies the most profitable mix of gasoline, kerosene, fuel oil, and other petroleum products, within the constraints of current prices for each product; the relationship among the products (producing more of one product reduces the amount of other products that can be produced); the costs to produce each product (which increase as the quantity produced from a barrel of crude oil increases); and the capacity of the refinery.

Natural resource scheduling is, in many ways, comparable to the oil refinery decisions. Forest lands have the ability to produce a variety of uses and outputs, with varying prices and values. The uses and outputs are related, sometimes complimentarily but also in ways that are competing or incompatible. The financial and environmental unit costs vary, in part, with the level of each use and output produced. And production is limited to levels that can be sustained in perpetuity. As described below, the Forest Service chose a linear programming approach —FORPLAN--for assisting in resource scheduling and other forest planning decisions. The requirement to assure sustainable timber production over long periods and the complex interrelationships among the various resources make linear programming quite useful in attempting to maximize resource uses and outputs within long-run, ecological limits.

Linear programming, however, has inherent limitations in supporting resource scheduling decisions. First, linear programming requires massive amounts of data to define the interrelationships among resources and the changes that result from manage-

ment activities. Linear programming also is ***deterministic—risk*** **and uncertainty cannot be included in the model, even though they are common in natural systems (65, 234). Finally, linear programming is *linear—all* relationships must be direct, continuous, and symmetrical (reversible).[2] Linearity is a problem because: 1) inputs on one site can affect the outputs and management costs of other sites—there are indirect effects of management (14, 146); 2) some inputs, such as facilities, cannot be adjusted in small increments--they are not continuous functions (14, 179); and 3) ecosystems may have thresholds-irreversible changes can result from management activities (65, 118).**

Land and Resource Allocation Decisions

Land and resource allocation decisions determine how uses and outputs are combined (or separated) over space. Thus, technologies for supporting allocation decisions must be able to evaluate spatial relationships among resources. Linear programming has some capacity to account for spatial relationships (122), and including spatial details substantially increases the size, cost, and complexity of the model (1 18).

The Forest Service has traditionally examined and presented spatial relationships with maps, which are a part of every forest plan. However, the maps have generally been produced by hand, with an enormous investment of time and **energy. Overlays can** be **used** to combine different types of spatial information, but the process of creating and using overlays is cumbersome and expensive. Thus, despite its importance, spatial analysis for land and resource allocation decisions in forest planning has been limited **by the** shortcomings of **FORPLAN and current mapping practices.**

Geographic information systems (GIS) are basically computerized mapping systems that can store, manage, and analyze spatial information. GIS are not optimization systems, but are very useful for examining spatial questions. After the user defines the relevant spatial information to be combined, GIS can display locations of specified conditions (e.g., mature timber on moderate slopes) or of situations sensitive to certain management activities (e.g., highly erodible soils or critical habitat for an endangered species). The Forest Service has been testing **a variety of GIS, and expects to have GIS available at each national forest eventually.**

GIS also has limitations for use in forest planning. First, the systems require sizable investments in computers, plotters, and software. The General Accounting Office (255) recently concluded that the Forest Service has not adequately analyzed the alternatives to the estimated $ 1.2-billion investment, and to date, Congress has not funded GIS acquisition by the Forest Service. In addition, GIS require spatial information, and putting such information into the systems is generally an expensive and time-consuming manual process. However, the cost of putting spatial information into a GIS may not much exceed that of manual mapping currently used in forest planning.

Impact Assessment Technologies

Ecological and Environmental Impacts

Examining the likely ecological and environmental impacts of management decisions is an important part of forest planning. Resource simulation models are the principal technologies used for this purpose. Resource simulations quantify the relationships within natural systems, and attempt to estimate the likely results of management actions. Many simulations have been developed for single resources; the most common are timber growth-and-yield models, although the Forest Service has also developed sediment yield and wildlife habitat models. A few have attempted to simulate changes in forest and ecosystem structure over time (with and without various management activities), but these more comprehensive models are usually more expensive to build, test, and use or more simplified, and thus less precise in their predictive ability.

The Forest Service is considered to be a leader in developing resource simulation models (146). However, in contrast to scheduling and allocation models, which address common decisions, the diversity of resources and resource relationships typically leads to unique simulation models that address locally or regionally specific issues and problems. The diversity of national forest lands and resources has prevented the development of universal models. The existing models are often used in modifying the general FORPLAN model to address local issues,

[2]Linear programming does not actually require freed linear relationships. Curvilinear and other relationships can be approximated with multiple equations, if the relationships are direct, continuous, and symmetrical.

but this has not always been done well (234), and some important data and relationships are poorly known (72, 278).

Economic Impacts

Predicting the economic consequences of management decisions is another important part of forest planning. The economics of management is typically examined by comparing the benefits and costs of the proposed activities. Distinct models for such analyses exist, but in forest planning it is done with FORPLAN. FORPLAN's objective function (the goal) is to maximize present net value (PNV)---the value of uses and outputs minus the costs, with future values and costs discounted to the present. (See ch. 8 for a fuller discussion of strengths and weaknesses of economic analysis in forest planning.)

The traditional tool used for assessing local economic impacts is input-output analysis. An input-output model describes an economy in terms of its quantitative financial interactions among manufacturing, service, and other sectors. The Forest Service has developed a standardized input-output model with localized adaptations—IMPLAN—for estimating economic consequences on each national forest. IMPLAN is useful for appraising the total economic impacts of a forest plan, but is insufficient for evaluating impacts on communities (278). (See ch. 8 for a more thorough analysis of IMPLAN and its limitations.)

Supplemental Technologies

Database Management Systems

Computerized databases are often used to store and manipulate inventory information for the national forests. Computerized databases are essentially sophisticated filing systems, with the ability to store, sort, and rearrange massive amounts of data. Information sorting is the only analytical capability of databases, and thus databases are not really analytical tools. However, relational databases can store inventory information with site relationships, and therefore, can provide data for other allocation and scheduling models and for impact assessment tools.

In addition, one computerized database can be linked to other databases. If uniform structures and definitions are used for inventories, individual databases can be aggregated, creating a "corporate database'—i.e., nationwide access to local data on national forest lands and resources. This would certainly assist the agency in the RPA planning process. However, the Washington Office has not yet decided on the nature and structure of such a corporate database. Many forests are delaying the initiation of forest plan revisions until they receive some direction on database structures and definitions (146, 166).

Knowledge-Based Systems

Knowledge-based systems (KBS), also known as expert or rule-based systems, are relatively new in natural resources management. Expert systems can be optimization models, depending on the rules incorporated into the system, but the goal for such systems is to replace traditional computer logic with a more humanlike reasoning process (146). Currently, KBS are usually based on ''if-then' rules, such as "if tree age exceeds the specified rotation age, then the stand can be scheduled for harvest' or ''if a stream of the specified minimum width, depth, and flow lacks spawning gravel, then the stream can be scheduled for fish habitat improvement." However, because of our limited understanding of the rules and limits of natural systems, KBS are used primarily for relatively simple, repetitive decisions.

KBS can also be interactive, such that systems ask the users a series of questions with subsequent questions depending on previous answers. In this capacity, KBS can assist decision support and impact assessment technologies by assuring that appropriate models and information are used. The Forest Service is developing a KBS to assist in assuring that project planning complies with NFMA and NEPA. However, KBS could be expanded to a broader role in coordinating information and analysis in forest planning.

Integrated Systems

Integrated systems combine various technologies with systematic, automated linkages. Computerized databases can be linked with GIS for allocation decisions; with resource simulations for estimating ecological and environmental impacts; and/or with a linear programming model for scheduling decisions. Simulations and GIS can also be linked with linear programmingg. The Forest Service is developing an integrated system—INFORMS---coordinated through the Rocky Mountain Forest and Range Experiment Station in Fort Collins, Colorado. Parts

of the **system have been used in various locations, but the integrated system has not yet been implemented (146). Another integrated system—TEAMS—has been developed at Northern Arizona University in Flagstaff, Arizona (54). TEAMS is used in teaching, and has been applied successfully on the Coconino National Forest and on other lands (146).**

As with all planning technologies, integrated systems have their limitations. First and foremost, the shortcomings of the component technologies must be recognized. Computer models cannot give perfect answers, because the models necessarily simplify reality, and results are less precise than they appear (13, 14). Not only modelers and analysts, but more importantly, managers and the public, must be aware of the limits of the technologies (60). Furthermore, the technologies and linkages must be understandable so that the public (and agency employees not involved in planning) can recognize what is being evaluated, what the decision criteria and other critical standards are, and how the results will be used. However, given these cautions, integrated systems and the technologies that they integrate can be very useful in land and resource management planning for the national forests.

FORPLAN AND FOREST PLANNING

Historically, forestry has focused on sustaining the production of timber and other forest products over long periods of time. The European tradition was to manage forests to achieve a ''fully-regulated condition, ' with stable annual timber harvests and approximately equal forest areas in various stages from seedlings to "mature' stands. Forestry education in America followed this tradition (63), but European forest regulation could not be adopted easily for the unmanaged U.S. forests (122). Various methods were developed to regulate harvest rates for old-growth timber, and to convert such stands to more productive conditions. These methods were essentially designed to determine the ***allowable cut—the*** volume of timber that could be harvested annually while forest productivity was maintained.

Relatively simple approaches to determining allowable cuts were used until at least the 1950s (122). However, two changes complicated the determination of allowable cuts. The first was the increasing importance of the national forests for timber and recreation, which led to the enactment of **the Multiple-Use Sustained-Yield Act of 1960, as described in ch. 3. The second was the recognition in the early 1960s that timber harvests from private lands, at least in Washington and Oregon, could not be sustained at their historic levels. These concerns and the development of computer models led to more sophisticated approaches for determining the allowable cut from the national forests.**

The Development and Selection of FORPLAN

Prior to 1973, the Forest Service had as many as 48 different types of functional plans for the national forests (212). In the initial response to NEPA, the Forest Service chose to develop integrated unit plans for areas within the national forests. RPA echoed this direction by requiring "land and resource management plans for units of the National Forest System," prepared under an interdisciplinary approach. NFMA then provided substantial direction on what to consider in developing plans.

Two linear programming approaches were developed initially to assist in integrated, multiple-use management planning for the national forests. One approach, the Resource Capability System (RCS), focused on site-specific responses to management alternatives. RCS analysis was generally organized by watersheds, and the model provided timestreams for resource yields, site-specific area control, and a balanced treatment of all resources (i.e., all resource outputs were included in the objective function) (125). However, RCS was not widely accepted because of its emphasis on watershed concerns (122) and because of its inadequacies for timber harvest scheduling and control (125).

The other approach was the development of a long-term timber harvest scheduling model, intended to assure the biological sustainability and multiple-use compatibility of harvest levels over an entire national forest (122). The frost such model was the Timber Resource Allocation Model (Timber RAM), developed in 1971. However, concerns about a timber bias and increasing interest in site-specific environmental effects led to the development of a more sophisticated timber harvest scheduling model, the Multiple Use-Sustained Yield Calculator (MUSYC). However, MUSYC was considered to be just a more sophisticated timber harvest scheduling model, rather than an integrated resource management model (122). Finally, FORPLAN was developed in the late 1970s to overcome some of these

limitations. FORPLAN followed the basic approach established in Timber RAM and MUSYC, but was modified to incorporate some of the advantages of RCS, such as timestreams for yields, improved area control, and an objective function that included all resource outputs (122).

In 1979, as planning was beginning under the new NFMA regulations, the Forest Service became concerned that confusion in management direction and excessive cost might result from having various, competing computer models to assist forest planning. On December 3, 1979, Associate Chief Douglas Leisz sent a letter to regional foresters and staff directors designating FORPLAN as the primary analysis tool to be used in forest planning (125). FORPLAN was chosen because it addressed two key issues in forest planning: cost efficiency, and an allowable timber sale quantity (the NFMA term for allowable cut) within constraints (123). With FORPLAN, the Forest Service felt it would have a consistent, unified approach to forest planning (122).

FORPLAN has evolved substantially over the past 12 years (125). As a result, there are two distinct versions of FORPLAN, and more than 10 releases (upgrades) of each version (64). Thus, more than 20 different FORPLAN models have been used in forest planning. Furthermore, each national forest structures the FORPLAN inputs to analyze relevant problems for that forest (173). In essence, each national forest has used a unique FORPLAN model in developing its forest plan, and will probably use a different FORPLAN model when it revises its forest plan.

What Is FORPLAN?

As noted earlier, FORPLAN is basically a linear programming model. It has three distinct parts. The first organizes the required information into the structure necessary for linear programming; technically, this is called the "matrix generator, ' because linear programming uses matrix algebra. The second part is the calculator-the linear program itself. The Forest Service **uses commercial linear** programming software for this. The third part of FORPLAN presents the solution in **a variety** of formats, **to assist in** understanding and **using the** results; this **part is called the** "report writer, ' because **it** produces various displays of the results.

Linear **programming is a technique for finding the best possible combination of outputs within specified limits. Thus, linear programming essentially has three components: 1) the objective function (the goal to be maximized or minimized), 2) the constraints (the specified limits), and 3) the production functions (the relationships between the constraints and the objective function).**

The Forest Service has directed that economic criteria will be used for the objective function in FORPLAN. This function is intended to include all national forest uses and outputs, using market prices or some other relevant value for unpriced outputs. (See ch. 8 for more information on valuation techniques.) Future values and costs are discounted to the present for comparing alternative investments. (Again, see ch. 8.) The objective is then to maximize the present net value of outputs by emphasizing production of the most "profitable" outputs (those with the largest difference between the price/value and the cost of production). For example, if recreation is valued at $10 per unit and timber is priced at $8 per unit, and if the costs to produce additional units is $6 for each, FORPLAN will emphasize recreation, within **the** specified constraints. FORPLAN will not necessarily choose only recreation, or even more recreation than timber; the **selection** depends on how recreation and timber outputs are related **to the constraints.**

A large number and wide variety of constraints are used in FORPLAN (122). Some constraints are absolutes—total forest **area,** productive capacity, minimum requirements or production **targets,** budgets, etc. FORPLAN also includes "flow constraints,' principally **to assure** sustained production of timber **and other** outputs over long periods; as described above, one flow constraint--nondeclining **even flow of timber-is** specified in NFMA. **A third category is** relational constraints, which allow the user to specify relationships **among** management activities **and** outputs; for example, road construction into a specific area could be required before timber harvesting is allowed there.

Production relationships **connect the constraints to the objectives. In** FORPLAN, these relationships are generally defined by analysis areas and management prescriptions (specific patterns of related activities). Each prescription in **each area** includes **costs** and output yields, to relate possible activities to the objective function, and is aggregated for each

of the relevant constraints. The prescriptions applied to analysis areas are called "decision variables," and FORPLAN selects among possible combinations to maximize the objective function while meeting all of the constraints.

FORPLAN's Strengths

FORPLAN has been used because it performs certain tasks very well and because it helps organize planning around certain issues. The strengths of FORPLAN have been described as: its analytical capacity, its focus on important issues, its common language for analysts, and its protection of agency discretion.

Analytical Capacity

One reason the Forest Service accepted linear programming and FORPLAN is that it can be used to consider thousands of possibilities (combinations of prescriptions and analysis areas). Linear programming is used because the number of decision variables to consider is beyond the capacity of the human mind (122). For example, in determining whether to manage an area for timber production, ***one*** must consider the productivity of the land for timber, the economics of timber management, the continued flow of timber over 100 years or more, and the relationships between timber management and water flows (quality and quantity), recreation use, big game habitat, endangered species protection, and other outputs and ecosystem requirements. In addition, such an analysis must be conducted for ***each*** area that ***might*** include timber production as part of the area's management. FORPLAN is a tool that, with the appropriate constraints, can perform such a complicated analytical task.

Focus on Important Issues

Most of the important **values of the national forests are related to trees and the manipulation of tree vegetation—wilderness, ancient forests, timber production, recreation development, visual quality, water flows, and the like (64). Concerns particularly focus on timber management—how much timber to harvest and from which lands.**

> To **foresters ..., the important issues in forest planning relate to active manipulation of the forest, and** such planning should focus on what timber harvest levels can be sustained over time, given the objectives and constraints from all forest uses (123).

FORPLAN focuses on these issues. FORPLAN is structured to examine land allocations to various management prescriptions, many of which include timber production. FORPLAN relates timber management activities to the other uses and values of the national forests. And, FORPLAN results are organized to provide information on land allocations especially with regard to timber production, and on timber and other output levels. Thus, FORPLAN is useful in addressing important national forest management issues.

FORPLAN, or a similar model, is also probably a necessary tool for forest planning. As noted earlier, NFMA limits the allowable timber sale quantity to a level that can be sustained in perpetuity-i. e., nondeclining even flow. A computerized model is undoubtedly necessary to analyze long-term timber harvest schedules, and thus to determine if the nondeclining even flow constraint is met. For several decades now, the simple formulas for determining the allowable cut, generally based on current growth and on harvesting the remaining old-growth timber, have been inadequate, and will probably remain inadequate for assuring sustainable timber production from Federal lands.

Common Language for Analysts

One of the problems in interdisciplinary efforts is that the various disciplines and specialties use different terms and measures for their particular concerns and problems. The direction to use FORPLAN required foresters, hydrologists, biologists, archaeologists, landscape architects, and others to deal with one model to address all the issues and concerns (64, 278). Thus, each of these specialists had to learn how to translate their particular concerns and problems into a common format. The requirement forced the specialists to work together, and to communicate among themselves. The use of a common model compelled interdisciplinary teams to be truly interdisciplinary-to combine their specialties for assessing management alternatives.

Some have suggested that FORPLAN, and quantitative analysis generally, has protected against "professional omnipotence. " In this view, computer models and analyses:

> . , . prevent professional groups within the Forest Service, especially foresters, from imposing their objectives for management of the forest on the rest of society (123).

Others note **that the Forest Service may have simply replaced professional wisdom with computer analysis for explaining the decisions (64), and that decisions based on computer analysis may be no more acceptable to the public than those based on professional expertise were in the late 1960s and early 1970s. Nonetheless, FORPLAN has shifted power within the agency from the traditional resource staffs toward the analysts and planners of the interdisciplinary teams (64).**

Protection of Agency Discretion

Some observers have asserted that FORPLAN has become a shield to thwart the efforts of interest groups to shift national forest management in various directions. The complexity of the issues analyzed and the multitude of constraints limit the ability of analysts outside the Forest Service to understand the process well enough to know where and how to modify the analysis to get the desired results. According to the model's principal author, K. Norman Johnson, FORPLAN:

> . . . is a formidable roadblock to gaining leverage to push the national forests in any direction other than the one they wish to go. The complexity and subtleties of its options, the comprehensiveness of its view, the incredibly ambitious task given to it by the national forests, and the tremendous variance in its use from forest to forest makes it difficult to understand . . .
>
> **Thus** FORPLAN is very effective at preserving local agency discretion. It represents a formidable way for the national forests to insulate themselves from their critics (123).

The difficulties in understanding FORPLAN is a weakness of the model, as will be discussed below. Furthermore, some have hypothesized that FORPLAN has shifted criticism and control from local interests to national interests, giving greater power to such centralized critics as the Office of Management and Budget, the National Forest Products Association, and The Wilderness Society (23). Thus, FORPLAN may not provide as much protection for local discretion as some have suggested.

FORPLAN's Weaknesses

As many observers have noted, FORPLAN has numerous weaknesses. Some are inherent in linear programming; as discussed earlier, linear programming cannot include risk and uncertainty, and assumes continuous, direct, and reversible relationships among variables. **The FORPLAN model has numerous unique shortcomings, such as massive data requirements, use of economic criteria for the objective function and the importance of constraints, lack of spatial details, and the 'black box' nature of the model. Additional problems exist with the system for supporting and using FORPLAN, such as documentation problems, inadequate verification, the loss of expertise, and the poor understanding of how results can be used in decisionmaking.**

The FORPLAN Model

Data Requirements—Linear programming requires massive amounts of data, and in terms of size and complexity, FORPLAN has extended the frontiers of linear programming (14). As noted above, FORPLAN requires analysts to develop costs and output yields in order to relate activities to the objective function, and relevant measures to relate activities to absolute, flow, and relational constraints. For each management prescription (such as clearcutting with site preparation for natural regeneration) and each analysis area (areas with similar resource conditions and responses to the prescriptions), the user must identify the expected schedule, over 100 years or more, for at least: 1) the implementation costs; 2) the quantitative yields for all relevant outputs (timber harvests, water flows, animal populations, recreation uses, etc.); and 3) the relationship to the various constraints (endangered species habitat protection, soil erosion limits, nondeclining even flow of timber, maintaining biological diversity etc.). Thus, FORPLAN clearly requires enormous amounts of information, which undoubtedly exceed the limits of knowledge.

Many critics have noted that data are inadequate to meet FORPLAN's needs. Timber inventories are often out-of-date (64). Yield information for other resources is rare, and ''Assessments [of nontimber resources] are subject to large measurement errors' (72). In its recent internal critique, the Forest Service noted the lack of data on water, old-growth timber, range condition, and threatened and endangered species, and the lack of tools for addressing cultural resources, biological diversity, erosion and sedimentation, cumulative impacts on water quality, visual quality, and wildlife habitat capability (278). The lack of data could lead the various resource specialists to coordinate their needs, but 'the agency still has not developed an effective strategy to develop and manage data systems" (64).

One particular data problem could cause serious legal difficulties for the Forest Service. NFMA requires assurance that clearcutting is used only where it is the optimal cutting system. However, "FORPLAN has an inherent bias for even-age timber management' systems, such as clearcutting (64), and comparable yield data for uneven-age timber management do not exist (278). "Research and practice has largely ignored . . . uneven-aged management systems' (64). This problem has not been widely recognized.

The lack of necessary data typically leads analysts and specialists to extrapolate existing data and to make various judgments and assumptions, as needed (64). "In most cases, modeling coefficients [the internal data] were based on anecdotal or 'best-guess' information rather than scientific quantification" (13). This is not all bad, especially when it leads to cooperative, interdisciplinary discussion and learning (64). However, in at least some cases, the resource specialists have become resource advocates, and subordinated the common good of the planning team to the needs of their disciplines (13). At this point, it is unclear whether FORPLAN has contributed to integrated resource management, as some have suggested (278), or has simply created "the illusion of interdisciplinary integration of all multiple uses' (13).

Objectives and Constraints-As noted earlier, the goal of the FORPLAN model is to maximize the present net value of national forest uses and outputs. While some have argued that this was clearly the intent of Congress (246), others are not convinced:

> It is more difficult to find justification for this economic approach in NFMA than the focus on timber management. . . A much stronger focus is the assurance of protection of the forest environment during all actions (123).

The economic objective function has added to the difficulties with data in building and using FORPLAN, because all resource uses and outputs must be measured in dollars, even though only timber has a true market price (64). (See ch. 8 for a discussion of valuation techniques for unpriced resources.)

All goals for national forest management are included in FORPLAN through constraints on the model. Insufficient constraints can lead to unrealistic estimates of uses and outputs (and thus to infeasible targets), but excessive constraints can cause capabilities to be underestimated and lead to significant opportunity costs (50).

The most limiting constraints in FORPLAN have been the flow constraints, especially nondeclining even flow for timber (278). Timber harvests are regulated by total timber growth, which is determined by the area allocated to timber management and by investments in timber growing. However, in forests with substantial timber inventories (i.e., with old-growth timber), nondeclining even flow limits timber harvests largely by the amount of land allocated to timber harvesting. In many western national forests with substantial old-growth timber, timber harvest flow constraints have often been ''used as surrogates for restrictions on harvest for economic, social, political, or environmental reasons" (122). Easing the rigid nondeclining even flow constraints could substantially increase all of the uses and outputs, without compromising long-term timber productivity (278). However, to the extent that timber flow constraints have been used as surrogates for other values, easing this requirement for FORPLAN analyses may be politically infeasible.

The choice of tools and data is not objective, because the selection carries implicit values and emphases (50, 51). FORPLAN maximizes the value of ***uses and outputs.*** Nonuse values, such as visual quality and soil productivity (or having undisturbed ecosystems or providing a natural resource legacy), can only be included as constraints to maximizing uses and outputs. The value implicitly associated with a constraint can be determined, but this is a costly and time-consuming process that has not been done extensively in forest planning (64). As constraints, nonuse values must be fully achieved at the specified levels, but FORPLAN grants no additional benefits for exceeding the specified levels. Thus, FORPLAN can examine tradeoffs among uses and outputs, but cannot readily examine tradeoffs between outputs and protection. This approach has been described as reactive--preserving current conditions and mitigating damages-rather than as proactive—managing ecosystem functions (234). Therefore, FORPLAN may not provide the balance among accommodating uses, producing outputs, and sustaining ecosystems as is intended in the laws guiding national forest management.

Spatial Limitations--FORPLAN's **capability to accommodate spatial relationships is limited. Initially, analysis areas were simply areas with similar conditions and responses to management activities--areas with comparable soils, similar timber stands, identical costs, etc. The areas did not need to be contiguous; in fact, version 1 of FORPLAN did not allow the analyst to specify whether the areas were contiguous (122). In version 2, spatial relations among analysis areas could be specified (65). However, including spatial details substantially increases the size of the model (and hence the cost to use it), and only a few spatial configurations can be analyzedinFORPLAN(118).**

Spatial relationships are very important in land and resource management:

> **In terms of outputs** such as water, wildlife and fish, and aesthetics, it is probably more important how a management action (for example, a timber harvest) is spatially laid out than how many acres are involved (1 18).

Furthermore, limited spatial details lead FORPLAN (and all other optimization models) to overestimate the feasible outputs (54, 72). This happens because implementation requires local adjustments and site-specific tradeoffs that cannot be included in FORPLAN (146). Unless additional spatial analysis is conducted, the use of FORPLAN to establish output targets in the forest plan can lead to planned targets that exceed the feasible productive capacity of the forest.

The "Black Box" Nature—FORPLAN is a very large and complex computer model; its complexity increases with the number of land areas, outputs, practices, and years being analyzed (51). In some respects, FORPLAN has gotten so complex that even professional users fail to understand model results.

> It is possible to build a model that is so complicated that even the analyst no longer understands why certain outputs are identified as optimal . . .
>
> The level of sophistication, and the concurrent ability to hide assumptions and manipulate data, have risen to the point that even trained users are not always aware of the ties that bind (122).

Furthermore, the data and constraints in FORPLAN can be, and at times probably have been manipulated to produce specific preferred results (13).

> Some interest groups believe that the data, the models, or the analysis is, or has been, intentionally or unintentionally distorted, twisted, or slanted to rationalize certain conclusions. Even worse, if these suspicions are occasionally true and discovered, then the entire analytical system, the analysts, and the planning process risks rejection. I think some of this has happened (64).

The sheer size **and** complexity of FORPLAN, or of any other computer model, lead to a distrust of the model (64, 234).

> The 'black box' nature of FORPLAN allows for data errors and hidden assumptions to go undetected (14).

The frequent modifications to FORPLAN and the resulting variety of FORPLAN models have added to the confusion (173, 179). Finally, FORPLAN has not been widely available for public examination and testing (123); however, the recent development of a FORPLAN model that can be used on a personal computer will alter this condition (64). All in all, FORPLAN has probably contributed to Forest Service difficulties in communicating with the public.

The FORPLAN Planning System

Documentation-The lack of model documentation has posed problems for FORPLAN. Documentation is needed to inform the public about FORPLAN, and to assure that its use is consistent, not arbitrary and capricious (51). However, "formal documentation [of the FORPLAN model] has always lagged well behind [the system's] development' (125). Although FORPLAN has been used since 1980, the final user's guide was not available until May 1986 (125), and scientific publications describing the system were sparse for the first several years (123). Thus, it has been difficult for agency analysts and outsiders to examine and review the technical structure of the model.

A **related problem is the lack of documentation of how FORPLAN has been used and on the underlying assumptions, yield data, etc. The forests have maintained "unclear and incomplete records such that new analysts could neither duplicate nor understand what had been done previously" (278). This lack of documentation could lead to successful legal challenges on the grounds that the analysis was arbitrary and capricious.**

Verification--Verification of the various assumptions, yield tables, and other inputs to FORPLAN has generally been inadequate (179). Unverified systems have undoubtedly been used because of the need for immediate answers in the ongoing forest planning process (146). Inadequate initial verification is not a fatal flaw, if forest plan implementation is monitored in a manner which allows the assumptions, yields, and other FORPLAN inputs to be examined; plan monitoring was intended, in part, to verify FORPLAN and its data (146). However, to date, monitoring has been inadequate for this task. (See ch. 6.)

Agency Expertise-In response to the direction to use FORPLAN, the Forest Service developed a pool of talented analysts and modelers (64, 146), and seems to have provided adequate training for using the system (278). However, retaining this expertise has proven to be more difficult. Mixing these experts with the traditional specialists within the Forest Service has led to "culture shock" and has created some hostility toward the analysts (64, 146). Furthermore, delays, poor data, and other planning difficulties led to disillusionment and "burnout" among analysts (64, 146). Apparently fruitless efforts also have contributed to low morale (50). Finally, the analysts often felt locked into their jobs; there has been no career ladder for talented individuals to move up in the organization (278). That the Forest Service still has the personnel to use and develop FORPLAN and other models is a tribute to the agency's tenacity and commitment, but additional steps may be necessary to assure that these people are retained.

Relationship to Decisionmaking—A major problem has been comprehending how FORPLAN analyses can be used in decisionmaking. The lack of ''clear understanding of the relationship between analysis and decision making" has led to many invalid and useless analyses (14). Analysts are typically separated (physically and by education and experience) from the decisionmakers (123), and managers often have not understood the limits of FORPLAN (64)--' 'people took FORPLAN and its results as gospel' (278). Unless they are familiar with computers, people commonly do not recognize that models "are dumb [and] do exactly what they are told' (64).

FORPLAN can be useful in assisting Forest Service decisionmaking, if its limitations are understood.

> FORPLAN's usefulness [is] as an aid to understanding the nature of forest planning problems [not as optimal answers]. . . Its major purpose is to provide insight into the behavior of multiple resources and their interactions, which in turn can be used to guide the development of effective plans and decisions, The model is more appropriately used to prevent wrong decisions than for making "right" decisions (13).

Virtually all analysts recognize that models are most useful for examining possibilities, and that using FORPLAN to obtain answers can waste money and inhibit development of a publicly acceptable forest plan. "The phrases 'FORPLAN says' and 'our model says' need to be purged permanently' from conversations with the public (64). Analysis is intended to help managers ''understand the forest, its potentials, limitations, and constituencies, and to use this knowledge to find a balanced, acceptable course of action" (64). Thus, FORPLAN is simply a tool, to be used with other tools in preparing implementable forest plans.

SUMMARY AND CONCLUSIONS

NFMA **does** not prescribe the use of any particular technology in forest planning, but various computer technologies can be very useful for analyzing alternatives and assuring requirements are met. The Forest Service designated FORPLAN as the primary analytical tool for forest planning, but the many shortcomings of the model and controversies over forest planning have led some to question whether FORPLAN may be part of the problem, rather than part of the solution.

Decisions and Tools

As discussed earlier, the purpose of national forest management is to accommodate uses, produce outputs, and sustain ecosystems. (See ch. 3.) In forest planning, important decisions about the scheduling (over time) and allocation (over space) of uses and outputs can be examined using various computer models. Linear programming is often used for scheduling decisions in business, and such an approach is useful in forest planning for examining the sustainability of uses and outputs over long periods. Linear programming also has some capacity for analyzing allocation decisions, but other tech-

nologies--notably geographic information systems —are better adapted for such analyses; however, GIS are expensive to acquire and use.

Analysis of the ecological and economic impacts of forest management is also important for planning. Resource simulation models are useful for examining environmental and ecological implications, and can be used to provide input for scheduling and allocation models, but more development is needed to provide sufficient analysis for forest planning. (See ch. 6.) Economic impacts can be evaluated by examining the benefits and costs of activities over time and by estimating the effect of management alternatives on local employment and income; the benefit/cost analysis is included within the structure of FORPLAN, and the Forest Service generally uses an input-output model--IMPLAN--to estimate local economic effects. (See ch. 8.)

Additional technologies can be used to supplement the decision support models (for scheduling and allocation analyses) and the impact assessment models (for ecological and economic analyses). Database management systems can be used to maintain and coordinate inventory and other data used by the various analytical models. A "corporate' database (i.e., national access to consistently measured, collected, and stored data) would be useful, but the Forest Service has not yet set standards for such a database. Knowledge-based systems (also known as expert systems) are useful for rule-based decisions, but the state-of-the-knowledge on forest and rangeland systems is too primitive to develop more than simple decision rules. However, knowledge-based systems can also be interactive (i.e., questions for users, with the answer determining the subsequent question), which opens numerous possibilities for forest planning. Finally, integrated systems provide for automated linkages among other technologies, and thus can be very useful for coordinating analyses; however, integrated systems are still being developed.

FORPLAN

Early in this century, following the European forestry tradition, simple formulas were developed to determine allowable timber harvest levels for the unmanaged American forests with their large stocks of old-growth timber. These formulas no longer sufficed by the late 1950s, and computer models were developed to assess the long-term sustainability of timber harvest levels. FORPLAN was an outgrowth of these models, and also incorporated various aspects of a land allocation model developed for watershed analyses. FORPLAN is basically a linear programming model that maximizes the present value of resource uses and outputs (minus costs) within the specified constraints. FORPLAN includes absolute constraints (e.g., acres, productive capacity, and targets or management requirements), flow constraints (for assuring sustainable production levels), and relational constraints (to specify relations among variables).

In December 1979, the Forest Service designated FORPLAN as the principal analytical tool for forest planning. The agency believed that consistency in analytical approach was necessary, and FORPLAN was chosen because it was available and addressed some of the key questions in forest planning: the allowable timber sale level under a policy of long-term sustainability, and the lands available for timber harvesting. This capacity of FORPLAN is one of its strengths for forest planning. Another strength is FORPLAN's enormous analytical capacity; it can consider hundreds of thousands of possible combinations of management prescriptions (combinations of management activities) and analysis areas. FORPLAN also has required foresters, biologists, archaeologists, landscape architects, and other specialists to translate their knowledge into a common format, thus forcing them to learn a common 'language' and encouraging real interdisciplinary efforts. Finally, some have asserted that FORPLAN's complexity has served as a barrier to criticism, and thus has preserved local agency discretion for forest management.

FORPLAN also has many weaknesses. Inherent in linear programming is the inability to include risk and uncertainty and the assumption that inputs and outputs are direct, continuous, and reversible (i.e., that prescriptions and analysis areas are independent of other prescriptions and areas, that inputs and outputs can be adjusted in minute quantities, and that there are no thresholds for ecological changes). Furthermore, FORPLAN requires data on costs, outputs, and the relationship to constraints for each prescription and analysis area. Such data requirements substantially exceed the knowledge base for many resources, including timber if uneven-aged management is to be considered (as is required by NFMA).

The structure of FORPLAN carries important implications for forest planning. The goal is to maximize the value of uses and outputs, but many uses and outputs are difficult to value because they lack market prices to indicate their worth. More importantly, nonuse values--e. g., protecting watersheds, preserving endangered species, improving aesthetics, and other values of having viable ecosystems—are included only as constraints on the uses and outputs. This structure implies that sustaining ecosystems is a constraint on production, and not a goal for managing the national forests.

FORPLAN has some capacity to analyze spatial considerations, but adding spatial data substantially increases the size, complexity, and cost of the model, FORPLAN is so large that sometimes even the users do not understand why certain results occur; it is also possible to manipulate the system and to hide assumptions. Furthermore, the documentation of the system and of the assumptions and data used has been inadequate, preventing others from examining the FORPLAN analyses. Parts of the system have not been tested (verified), although sufficient monitoring of implementation could provide the testing needed. (See ch. 6 for more on monitoring.)

The Forest Service has done a remarkable job of acquiring the analytical capacity to use FORPLAN. However, the difficulties in forest planning and the lack of promotional potential is causing low morale among analysts. The lack of clear understanding of how analyses would be used in decisionmaking has added to the dilemma. Managers have sometimes used analytical results without understanding the limits of the analysis. At other times, managers have ignored the results because they did not trust the system or the analysts. Better communication between analysts and management and with the public is needed if FORPLAN is to be useful in forest planning.

Options for the Future

FORPLAN will undoubtedly continue to evolve and be used in forest planning. The agency has sunk a lot of money into developing the system and in finding and training the people to use it (23). FORPLAN can provide useful information (13, 226), and it or a similar model is probably necessary to analyze the sustainability of timber harvest levels over long time periods. Furthermore, there are few real alternatives to FORPLAN (179). Thus, FORPLAN will continue to be used.

Although the use of FORPLAN in forest planning could be improved, it cannot do all of the analysis required for forest planning.

> No approach will produce a perfect model of the real world, because all models are abstractions which necessarily are simplifications of reality (14).

Thus, FORPLAN should be linked to other systems. The Forest Service is already using many resource simulations for input to FORPLAN, but additional development and more integrated use of simulation models are needed (146, 234). A GIS is probably essential to assure the spatial integrity of planning alternatives, and a corporate database would provide a consistent structure for the data needed in the various analytical systems.

A more hierarchical planning structure could also contribute to the use of FORPLAN in forest planning (72, 179). Some ecological modeling must occur at large scales, other at much smaller scales (172). Furthermore, FORPLAN has been devised to try to answer all forest planning questions at one time (14). The regulation requiring a timber sale schedule in the forest plan has particularly contributed to the complexity of FORPLAN (179, 234). FORPLAN could be substantially simplified, to the point where users and outsiders could understand the analysis, if more analysis was done before FORPLAN was used (234) and if additional planning and tools were developed for forest plan implementation (54, 146).

Finally, better communication about the results and limitations of the FORPLAN analyses is essential. A simpler FORPLAN model under a hierarchical planning structure would help (14), but closer connections between analysts and managers are also necessary (61, 123), FORPLAN is a useful tool for examining productive capacity and tradeoffs among activities (13). These analyses should contribute to public participation, rather than limit or prevent.

Chapter 8

Economics in National Forest Planning

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Chapter 8
Economics in National Forest Planning

Economic considerations enter into the strategic planning process for national forest management in two ways: in evaluating the tradeoffs among the values generated by the forests; and in identifying the economic impacts of national forest management. This chapter briefly describes the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) and the National Forest Management Act of 1976 (NFMA) requirements for economic analysis, and then assesses the use of economics in determining the management balance and in identifying the economic impacts. The chapter concludes by analyzing the relation of the Forest Service budget process to strategic national forest planning.

LEGAL REQUIREMENTS

RPA and NFMA substantially expanded the role of economic analysis in Forest Service planning and management (246). RPA requires: an Assessment that analyzes resource supplies and demands and evaluates investment opportunities; a Program to identify investment needs and to compare outputs, results, and benefits with costs; a Statement of Policy to guide the formulation of budgets; and an Annual Report to provide accountability for expenditures and activities, with appropriate measures of relevant costs and benefits and with representative samples of below-cost timber sales.

National forest planning must also include economic analysis. NFMA requires that economics be integrated with physical, biological, and other sciences by the interdisciplinary team (section 6(b)). Economic and environmental aspects of management are to be considered in planning for the multiple uses (section 6(g)(3)(A)). Economic impacts, along with environmental, biological, esthetic, and engineering impacts, are to be reviewed on each advertised timber sale using even-aged silvicultural techniques (section 6(g)(3) (F)(ii)). Economic, physical, and other pertinent factors are to be considered in identifying areas not suited for timber production (section 6(k)). Road needs are to be met on an economical and environmentally sound basis, and road standards are to be appropriate considering safety, transportation costs, and land and resource impacts (section IO(a) and (c)).

This guidance in NFMA strongly suggests congressional interest in efficient Forest Service management. However, as discussed in chapter 3, Congress is also concerned about fairness and balance. NFMA clearly directs management in accordance with the Multiple-Use Sustained-Yield Act of 1960 (MUSYA), which requires the Forest Service to "best meet the needs of the American people." MUSYA also prohibits maximizing returns or outputs as the sole criterion for management, and NFMA adds that the timber harvesting system is not to be chosen primarily to maximize returns or outputs. Nonetheless, MUSYA also requires management ''with consideration being given to the relative values of the various resources.'' Finally, although there is no explicit direction in law to consider community stability in forest planning, Congress has on numerous occasions clearly expressed concerns about the impacts of national forest management on local communities.

THE BALANCE AMONG RESOURCES

In MUSYA, Congress explicitly directed the Forest Service to consider the relative values of the various resources. This implicitly requires an economic evaluation, because the science and art of economics focus on tradeoffs in values. Economics generally concentrates on two issues: ***efficiency*** and ***equity.*** Economic efficiency aims at minimizing waste, generally by reducing the cost to produce a given level of output or by increasing the outputs from a fixed budget. Efficiency is no less important for government agencies than for private firms, but it is more difficult to achieve because the outputs are generally less precisely measured.

Equity considerations center on questions about the fairness and balance of activities, and about the distribution of income and benefits. Historically, the field of economics has emphasized efficiency. For example, in their recent book on the economics of multiple-use management, Bowes and Krutilla (31) dismiss the distributional equity consequences of public land management in one paragraph, and then spend 300-plus pages on economic efficiency. Efficiency has traditionally been emphasized because it can be measured and evaluated, while

unbiased measures of fairness and balance do not exist. Nonetheless, equity-the fair distribution of income and benefits--is one of the principal concerns of government.

As discussed in chapter 3 and noted above, Congress did not accept efficiency as the principal consideration for managing the national forests in enacting MUSYA. Nonetheless, economic efficiency is not irrelevant. In the debate over NFMA, Senator Dale Bumpers (Arkansas) expressed concern over ''the problem of wasteful investment in timber production.' More recent debates over below-cost timber sales also suggest concerns about the efficiency of Forest Service timber activities. The Office of Management and Budget (OMB) is particularly concerned about the efficiency of government spending (217). The magnitude and persistence of the Federal budget deficit will make the efficiency of government activities, including national forest planning and management, a continuing concern.

Many economists, inside and outside the Forest Service, believe that determining the balance among resource uses, outputs, and protection is essentially a question of economic efficiency-if uses and outputs can be valued correctly and the interrelationships can be quantified accurately, the proper balance can be determined by a simple economic efficiency decision rule. Some have even argued that economic efficiency should be the ***primary*** criterion for forest plans:

> If properly done, NFMA planning should be nothing more than a series of cost-benefit analyses that lead to economically optimal forest plans (309).

Economic Efficiency in National Forest Planning

Efficiency is measured by examining costs and benefits. Efficiency increases as costs to produce the same benefits decline or as greater benefits are generated at the same cost. In practice, improving efficiency typically focuses on the cost side--the appropriate budget level and proper mix among activities. Neoclassical economic theory dictates that the "correct" budget level and mix are defined by the relation of costs and returns, with expenditures increasing as long as the returns are greater **than the** costs; ultimately, the last dollar spent should yield a return of exactly one dollar. (If the return is greater than a dollar, more expenditures are warranted, but if the return is less than a dollar, too much has been spent.) In technical parlance, the efficient budget level is the level where the marginal benefits equal the marginal cost for each activity; this defines both the total budget and the efficient balance.

In the private sector, benefits are typically revenues, but a government agency often generates social benefits from goods and services provided rather than revenues. As noted earlier, many of the uses and outputs of the national forests do not have market prices. However, numerous techniques have been developed to estimate the value of unpriced or subsidized uses and outputs. (See box 8-A.) Calculated values can, in theory, be used as proxies for social benefits. Thus, the neoclassical theory of economic efficiency can still be used, if the value of the goods and services (including nonuse values) can be determined.

Investments complicate the comparison of expenditures and returns, because expenditures and returns occur at different points in time, and the value of a dollar today is greater than the value of a dollar tomorrow. (The difference in value is interest, usually presented as an annual rate.) However, expenditures and returns can be compared, if they are adjusted for timing at the relevant interest rate. (This rate is also known as the discount rate, and the procedure is called discounting future costs and returns to the present.) There are numerous methods for comparing discounted expenditures and returns. A common one, and the one used by the Forest Service, is to subtract the present (discounted) costs from the present (discounted) value of the returns to determine the ***present net value*** of the investment. The marginal approach of neoclassical economics is not as useful, since investments are generally not small changes. Nonetheless, a similar decision rule exists: if the present net value is positive (if the discounted returns exceed the discounted costs), the investment is desirable.[1]

The Forest Service uses an economic efficiency approach in its forest planning model--FORPLAN—to assess the balance of uses, outputs, and protection

[1]The decision rule for ranking investments is somewhat more complicated, since alternative investments are likely to have different costs. The ratio of discounted returns to discounted costs (the infamous benefit/cost ratio) is more useful to rank alternative investments, although a number of other techniques (e.g., the internal rate of return) are also feasible for ranking investment options.

Box 8-A—Valuing Nonpriced Goods and Services

Economic value of nonpriced resources results from both value in use and certain nonuse values. Use values include not only today's use, but the value of having the option to use the resource in the future (commonly known as option value). Nonuse values include the value of knowing the resources exist as well as the value of preserving the resources for the future; these values are often referred to as existence and bequest values, respectively.

There are two basic approaches to measuring economic value of nonpriced uses and outputs. One is based on the financial impacts of current use, usually by measuring either total expenditures or the value added because of those expenditures. Except for evaluating local community impacts, this approach is rarely used, because it does not measure the value of the resource. It would be like measuring the value of timber by tabulating how much timber purchasers spent on labor, equipment, gasoline, etc.

The second approach is based on estimated demand for the resources. This approach is generally preferred for its sound theoretical basis, but is more difficult to apply, because it requires demand curves. Methods have been developed for calculating demand curves for recreation and other nonpriced uses and outputs, typically relying on travel costs (the *travel cost method) (210),* on site attributes (the ***hedonic pricing method) (31),*** or on an artificially structured bidding market (the *contingent valuation method) (58). All* such methods develop a demand curve relating quantity demanded to various prices. Demand curves can also be developed for nonuse values using the latter two methods.

Demand curves for nonpriced resources are usually used to calculate ***consumers' surplus.*** Consumers' surplus is the total additional amount that the beneficiaries are willing to pay for the good or service, in excess of their current expenditures. It is also described as the possible revenues of a perfectly discriminating monopolist (i.e., one who could charge a different price to each customer). This is a useful measure, but may not be directly comparable to market prices for commodities, since the market price is how much the buyers do pay, not how much they would be willing to pay.

The Forest Service modified the traditional consumers' surplus in the 1990 RPA Program (281) by estimating the *market-clearing price, the* price that would balance demand and supply if the uses and outputs were marketed. Theoretically, supply curves would be developed, and the market-clearing price would be the price at which supply and demand are in balance. The 1990 RPA Program discusses developing supply curves from production cost data, but presents no evidence of such with its estimates of market-clearing prices; the market-clearing prices in the report suggest that a single supply curve was used in all regions for many different activities. This approach is conceptually strong, but additional information on supply curves is needed.

in national forest planning (246). FORPLAN is a computer model that maximizes the value of uses and outputs while meeting specified constraints. (See ch. 7.) The goal (technically, the objective function) is to maximize present net value of resource uses and outputs; thus FORPLAN fits the neoclassical economic theory of economic efficiency.

Limitations of FORPLAN in Achieving Efficiency

Resource Values

One difficulty with economic efficiently in forest planning arises from the questionable comparability of values for marketed and unpriced uses and outputs. Substantial research efforts over the past 30 years have developed various techniques for valuing unpriced resource uses and outputs. (See box 8-A.) Researchers have defended various methods as the best or most appropriate (31, 58, 210), and some suggest that the proper technique depends on the nature of the resource (242). Furthermore, the comparability of market prices for commodities to the calculated values for unmarketed or subsidized resources has long been debated (154, 262). The extent of the polemic over this issue indicates substantial uncertainty over the comparability of market prices for resource commodities with the calculated values for unpriced resources. This limits FORPLAN's usefulness in examining the economic efficiency of forest planning and management.

Another problem with using FORPLAN to assess efficiency is that some values are not included in the objective fiction. As discussed in chapter 7, ***the*** objective function in FORPLAN only contains values for uses and outputs. However, people also value just having natural areas, protecting the opportunity to use them in the future, and preserving a legacy for future generations-values generally known as option values, existence values, and

bequest values. These values are not included in the FORPLAN objective function, and cannot be readily assessed relative to use and output values. Instead, nonuse values are expressed as constraints on the objective function. This approach provides only the selected level of protection for nonuse values; less protection is not allowed, and additional protection yields no additional benefits. Assessing the tradeoffs between outputs and nonuse values is very difficult, at best. Furthermore, considering nonuse values as constraints, and uses and outputs as objectives, suggests unequal treatment; uses and outputs are benefits, but nonuse values are limitations on national forest management.

Finally, even supposedly concrete values are subject to considerable uncertainty. Off-budget funds (see below) are often excluded from economic analyses, and cost data used in RPA and in forest planning may be inaccurate (217, 259). Timber values are also subject to debate. One analyst has noted that forest plans assume unrealistic future timber prices (187); these prices are based on projections using the Timber Assessment Market Model, which is quite sensitive to assumptions about future U.S. economic performance, wood use technology, and the like (259). The imprecision of cost data and timber values limit the usefulness of the efficiency analysis in FORPLAN.

Resource and Site Interactions

Another limitation to using FORPLAN to assess the efficiency of forest management alternatives is that current knowledge about physical, biological, social, and economic interactions among the resources is rather limited. For example, efficiency is the essence of the debate over below-cost timber sales. The Forest Service asserts that timber sales can generate nontimber benefits, and that modifications to generate such benefits often increase costs and/or decrease receipts, but that the sales are the most efficient means to achieve the benefits (222). Critics charge that the Forest Service not only loses money on below-cost sales, but that timber sales often damage, not benefit, the other resources (153, 187, 327). However, the cost to generate the desired nontimber benefits without removing the timber (e.g., cutting the trees and letting them decay) has rarely been examined. Similarly, the possibility of greater efficiency in the timber sale process has not been analyzed. Thus, the below-cost timber sale debate is being conducted with incomplete information on all sides. Such fragmentary understanding of the effects of activities on resources and ecosystems limits FORPLAN's capability to analyze the efficiency of alternatives.

A related difficulty is the meager data on the uses and outputs of noncommodity resources. While timber harvests are measured, to charge for the timber removed, recreation and other noncommodity uses and outputs are often estimated.

> Annual recreation use figures are notorious among field officials for being based on "a horseback estimate' of increase or decrease from the previous year's level, a figure which itself was based more on a manager's rough sense of use than on any direct quantitative measurement (217).

Thus, imprecision in the existing data, as well as the lack of understanding of resource interactions, restrict the capacity of FORPLAN for efficiency analysis.

The analysis of economic efficiency is further complicated by site interactions, because the management of one site may affect the efficiency of activities on other sites (138). For example, constructing a road might be an efficient means of providing access to two adjoining stands of timber if both areas are managed to produce timber, but might not be an efficient use of resources if only one area is producing timber. Management efficiency of various sites is most likely to be interdependent when access (principally road construction) is a significant portion of the management costs. However, the shortcomings of FORPLAN for addressing site-specific issues also limit its capability to assess the efficiency of interdependent management decisions.

Inefficient Prescriptions

Many critical decisions about balance and efficiency are decided before FORPLAN is used (30). In particular:

> Decisions about suitable timberlands, the allowable sale quantity of timber, wilderness, unpriced outputs such as scenic and wildlife resources, silvicultural systems and land allocations are strategic elements of a forest plan that are generally decided outside a FORPLAN analysis, using subjective evaluations that reflect considerations other than economic efficiency (246).

Among the principal inputs to FORPLAN are the management prescriptions-the general manage-

ment practices that are proposed for an area over time. If timber is to be harvested, the prescription would specify the rotation (harvest) age and the silvicultural system to be used, the reforestation practices, and any intermediate stand treatments, before the harvest and/or after successful reforestation. Prescriptions would also identify other activities expected in the area, such as wildlife habitat improvements, recreation developments, range improvements, and erosion control.

The timber industry has argued that the Forest Service's timber management prescriptions are inefficient, that different systems could yield greater timber benefits and still protect the other values (308). However, while research has examined the costs and benefits of specific activities, very little has been written about management prescriptions and economic efficiency (123).

Forest Service research has shown that many timber sales are modified to mitigate or enhance other resources, often increasing costs or reducing revenues (19, 182, 223). Comparing the efficiency of various management prescriptions can be done under a patchwork dominant-use management framework (as described in ch. 3), because the outputs of the dominant resource can be compared to the management costs (assuming that the environmental quality and resource conditions standards are still maintained). However, assessing efficient prescriptions under integrated resource management is difficult because it requires an accurate understanding of the quantity and quality changes in all resources that result from a management activity (31, 221). Such knowledge, as well as measures of quantity and quality for all resources, is currently lacking.

Investment Commitments

Government agencies generally do not distinguish between capital and operating expenditures. Annual budgets and appropriations generally contain no special provisions for addressing capital investment needs. However, separating these costs from operations and maintenance is necessary for efficient investment, especially ' 'if future expenditures [such as timber stand improvements] are tied to present investment decisions [such as reforestation]" (3 1). Mixing capital and operating expenses can contribute to inefficiency; future investments might be poorly timed, if they are made at all. However, Congress is reluctant to commit itself to fund future investments, regardless of the efficiency of such investments. Political realities thus inhibit the management efficiency that FORPLAN shows to be feasible.

Determining the Balance: An Equity Issue

The technical limitations of FORPLAN are not the only reason why economic efficiency is not used to determine the proper management balance for the national forests. Observers have noted the public's general lack of interest in economic efficiency for Federal land management (138), and even a philosophical opposition to efficiency standards:

> Even supposing that the measurement problems could be miraculously overcome, it would not change the fact that the benefit-cost analysis is a direct descendent of utilitarian principles and thus philosophically unacceptable to a growing segment of the American public (164).

Using efficiency to determine management is also problematic in that the beneficiaries of government activities often do not pay the costs (44). Hunters, hikers, off-road vehicle users, and arguably even ranchers and loggers often do not pay the full cost for the benefits they receive. This is the essence of the argument set forth by those who advocate market solutions for management problems, However, Congress rejected this approach in national forest management. Determining the mix of uses, outputs, and protection is more a question of balance and fairness-equity-than one of efficiency.

The Forest Service has implicitly recognized that efficiency alone cannot determine the acceptable management direction for the national forests. Although FORPLAN compares alternatives for a national forest, the preferred alternative (and the final forest plan) is rarely the one that maximizes efficiency, as defined by present net value. Nonmaximum selections by Forest Service line managers essentially acknowledge that computer models probably cannot choose a balance among resource uses, outputs, and protection that is acceptable to the public.

How, then, can balanced management be established in forest planning? As discussed in chapter 5, Congress intended the Forest Service to determine the proper balance by listening to the public. This does not imply public decisionmaking, but that the agency discuss goals, opportunities, and limitations with affected and interested individuals and groups.

Through such interaction and deliberation, the agency can learn about the public's desires and values, about new possibilities and practices for efficient and effective production and protection, and about the use and output levels the public finds acceptable. Members of the public can listen and learn about their own and each other's desires and values, fostering cooperation, rather than enmity. This is not to suggest that such discussions can lead to agreement on all issues. At times, the Forest Service must make hard choices. However, balance can only be achieved through meaningful interactions among the agency and various public interests.

IMPACTS OF NATIONAL FOREST MANAGEMENT

Decisions about national forest management affect not only direct users, but also local communities. Congress has also shown concern for community stability and the effects on counties of the tax exempt status of national forest lands. These concerns, and efforts to address them, affect strategic planning for the national forests. The policy of sustained yield for stable timber harvests is based on providing stability for communities. Much of the debate over the economic impacts of national forest management has focused on the effects on the timber industry. The following discussion follows this emphasis, but it is not intended to suggest that the effect on other sections of local economies are unimportant. The difficulty of assessing such effects is also discussed.

Community Stability

Concern and Approach

Congressional concerns about the impacts of Federal land management on communities date back at least to the 1897 Forest Service Organic Act. The floor debate over the purposes for which forest reserves could be established strongly indicates the congressional interest in making timber available to citizens (233, 326). Some have argued that Congress has clearly directed national forest management to consider community stability (185). Others assert that the congressional commitment to community stability is far less clear (218), that while local planning under NFMA includes community stability, national planning under RPA virtually precludes considering it (219).

Regardless of the clarity of congressional commitment to community stability, the concern is real. However, the legislative direction for the Forest Service to consider community stability is ambiguous, at best (193). Nonetheless, as a strategic planning process, NFMA planning is to address issues and concerns, and community stability is often raised as a local concern (225). Thus, community stability must be considered as an issue in the forest planning process.

Impacts on communities are typically assessed in forest planning using IMPLAN--a multicounty input-output model adapted to each national forest. (See ch. 7.) Input-output analysis relies on a general equilibrium model of the economy, with quantitative relationships to describe the interactions among various manufacturing, service, and other sectors. A demand-driven input-output model, such as IMPLAN, estimates the impact of changes in national forest uses and outputs on employment and local income; it has the ability to separate the direct impacts on one sector from the indirect and induced impacts on other sectors. Thus, IMPLAN can display the local economic consequences of various management alternatives for the national forests.

Limitations

Despite congressional and local concern for community stability, the Forest Service has limited ability to assess and to achieve community stability.

Assessing Community Stability-one **difficulty in addressing community stability stems from the imprecise definitions of community and stability (157, 218). There is no legal definition of, or requirement to manage for community stability (193). Furthermore, academia has also struggled with these concepts.**

> **The first three speakers [at a 1987 conference on community stability (150)] were an economist, a sociologist, and a lawyer. They said, essentially, we can't measure community stability, we're not sure what it means, and the Forest Service has no legal authority to do anything about it. In response, at lunch, a Forest Service spokesman said yes, that** might all be true, but the Forest Service is going to "do community stability anyway" (224).

Economists generally define communities based on their distinctive economic functions (236). Sociological definitions typically include both geographic and cultural elements. "Community" can also be

defined by social relationships and interactions, or by a shared identity (145). This latter aspect is particularly important for some groups, such as loggers (40). Small rural communities are often assumed to fit the definition on all counts, but such is rarely the case (145). Newcomers frequently bring different styles and cultures to these communities (230); however, these do not always conflict with the long-term residents of rural areas (26). What all this means is that there is no simple definition of community that can be used for estimating and reporting the effects of national forest management on ''communities.'

Stability is equally difficult to define, but typically is measured in economic terms-jobs, income, prices, and the like (157, 169). This is important information, to be sure, but not the full measure of a community's stability. However, quantitative measures of social stability do not exist. Furthermore, stability is often equated with maintaining the status quo, but most recognize that change is an essential part of long-term stability, that communities are dynamic (218, 236). The difficulty lies in trying to determine the amount and pace of change that affords stability-too much or too fast is unstable, but too little or too slow results in stagnation. The difficulty in measuring the amount and pace of change and the lack of measures of social stability limit our ability to assess the stability of communities.

Input-output analyses have two additional shortcomings for assessing community impacts. First, economic sectors are reported by county, but the resulting data can mask local variations within a county. For example, Montana's Gallatin County contains both timber-based communities (Gallatin Gateway and Belgrade) and recreation towns (West Yellowstone and Bozeman); similarly, neighboring Park County has one town dominated by a sawmill (Livingston) and another dominated by the tourist trade (Gardiner). Thus, using county data may not provide an accurate picture of the impacts of national forest management on individual communities.

In addition, the economic data used in input-output analyses do not provide comparable details for all resource-based sectors of the economy. The U.S. Department of Commerce defines lumber and wood products as a separate manufacturing industry. In contrast, forestry and livestock production are part of agriculture, while recreation is scattered among a host of industries generally classified as retail trade or as services. Expenditure profiles can be developed for each type of recreation to get recreation employment and income data comparable to timber employment and income data (191), but the task is costly and time-consuming. Thus, existing data on economic interactions provide a more thorough picture of the impacts of national forest management on the timber industry than on other industries that may also rely on the national forests.

Achieving Community Stability--The forest management policy of sustained yield for a stable timber supply has long been justified on the grounds that it promotes community stability (219). Thus, community stability has often been equated with timber industry stability (8, 236). While there is broad recognition of the importance of other resources to certain communities, much research and concern still concentrates on the stability of communities whose economies depend on producing wood products from national forest timber.

To date, no empirical evidence has shown that stable timber production leads to stable communities (62, 69, 93), and some studies suggest that timber-dependent communities may be less stable than other communities (97, 311). A broad array of factors affect the demand and supply of wood products, and the stability of local wood supplies is but one of these (193).

Researchers have found that the cyclicality of the timber industry has led to a certain community response to distress-a passive expectation that conditions will eventually return to normal (40). This, however, can lead to a loss of local leadership that could help the community adjust to upheavals (1 15). In addition, a mill closure alters the structure of a community quickly and substantially, further limiting its ability to respond (314).

The Forest Service has recognized the difficulties associated with defining and achieving community stability. Thus, its community-stability goal has been defined as that of preventing sudden, catastrophic instability when possible by gradually phasing in changes, thus minimizing economic and social impacts. According to Associate Chief George Leonard (151), "community stability means the avoidance of radical, or abrupt, changes in the economic or social structure.

This suggests that community **evolution may be a more apt goal than stability. Darwinian evolution occurs through the accumulation of small, gradual changes. However, an alternative view of biological evolution (known as punctuated equilibrium) suggests that species may evolve quickly, then remain quite stable for long periods before disappearing quickly (73). This alternative view—long periods of stability interrupted by abrupt changes—may also be more descriptive of community evolution.**

Rural communities frequently depend on one or a few industries or firms; economic changes (regional, national, and/or international) may cause severe local distress and upheaval. A sawmill, for example, may be able to adjust production levels, but it cannot close gradually. The national forests accommodate uses and produce outputs, but the Forest Service cannot control the economic factors that determine a fro's ability to stay in business. With limited responsibility and limited means, the agency clearly has limited ability to promote community stability (61). Perhaps the best that can be hoped is to not be the cause of major distress, as the Forest Service has suggested.

At the 1987 conference on community stability (150), a Bureau of Land Management (BLM) employee questioned the extent of the industry's responsibility for community stability (175):

> **What is the timber industry's role and responsibility in community stability? . . . Specifically, for those companies with a land base, to what extent should their harvest scheduling consider community stability, especially in light of projected future shortfalls? For those companies with no land base, or no merchantable volume of lumber, how should the company consider future investments, especially to expand production capabilities, considering community stability in the long run? Recognizing that many companies are active, positive members of the community (while they are there) who make numerous contributions to the community ..., what is the timber industries [sic] larger role in community stability?**

In other words, can the Federal Government be responsible for community stability when the private sector cannot be compelled to ignore market signals in making timber harvesting and mill capacity decisions that affect short- and long-term community welfare? Can, and should, the national forests insulate communities from decisions in the private sector? And, what about communities that have grown largely in response to Forest Service efforts to develop a timber industry in certain areas (291)?

Implications for National Forest Planning

The impact of national forest management on local communities is an issue that must be addressed in national forest planning. Although the congressional direction for considering community stability is imprecise, the Forest Service is to be responsive to public concerns in the planning process, and the public is often concerned about the very real impacts of national forest management on communities. Thus, as the Forest Service has recognized, the community stability issue cannot be ignored.

Because of the agency's inability to control future economic conditions, it is probably infeasible to assure community stability. Nonetheless, the Forest Service should disclose a full picture of the likely economic and social consequences of alternative actions considered in the planning process. Current plans rarely display all financial information+. g., government revenues, expenditures (including those financed from revenues), and receipt-sharing payments—and often do not discuss impacts that occur away from the forest-e. g., on downstream fisheries and municipal and industrial water users (225).

IMPLAN provides a beginning (and will produce a more complete picture as the Forest Service specifies the various resource-related sectors more fully), but is not sufficient to display the full suite of ramifications of national forest management. First, the Forest Service must not view the national forests as the only source of resource uses and outputs; other landowners can also provide the various uses and outputs. In the planning process, the agency must consider the actions of other landowners (including neighboring national forests), and explore the opportunities to support them.

Furthermore, the Forest Service must also consider specific businesses that wholly or substantially depend on the national forests (e.g., ranchers with grazing allotments, certain sawmills, and outfitters and guides who rely on Forest Service backcountry). In particular, the Forest Service must examine the extent to which a management alternative might threaten the dependent business. The agency must be aware of and sensitive to the businesses' minimum operating needs. This requires close cooperation between the agency and dependent businesses, but

the Forest Service must also be careful to avoid making decisions behind closed doors. Such "back-room deals" would harm the agency's credibility with others interested in national forest management.

Payments to Counties

Since 1908, the Forest Service has returned 25 percent of its receipts to the States for use on the roads and schools in the counties where the national forests are located; these payments are variously called payments to States, payments to counties, and Forest Service receipt or revenue-sharing.[2] These payments originated in 1907 (at a 10 percent return) to compensate counties for the nontaxable status of Federal lands and to encourage western development. (Other Federal lands were also not taxable, but public domain lands were available for homesteading and other land disposal programs, and thus were expected to become taxable at some point.) The rate was increased to 25 percent in 1908, and the money was permanently appropriated (i.e., the payments would be made unless Congress acted to stop them). However, there is no discussion in the ***Congressional Record*** as to why ***25*** percent was deemed the appropriate compensation for counties.

Forest Service 25-percent payments are often very important to counties. They are not the only compensation paid to counties for the local influence of the Federal presence, but they are the only payments affected directly by national forest management. Furthermore, in some heavily timbered counties in the Pacific Northwest, Forest Service payments account for more than 80 percent of county operating budgets (217). Thus, counties are very interested in maintaining or increasing Forest Service receipts (and the resulting 25-percent payments).

Timber receipts account for about nearly 95 percent of total Forest Service receipts in most years (298). The dominance of timber receipts, combined with the importance of Forest Service county payments, often makes the counties proponents of Forest Service timber sales, even at the expense of other resources and industries (217). However, timber receipts also fluctuate widely, often changing by 50 percent or more from one year to the next (298), and are much more variable than other Forest Service receipts. (See figure 8-l.) Thus, under the current system of compensating counties for the tax exempt status of national forest lands, counties have little certainty about their annual payments (and hence, their budgets). Still, they are more likely to support Forest Service timber sales than other activities in the planning process.

FOREST PLANNING AND THE BUDGET PROCESS

The annual Forest Service budget has a substantial affect on national forest management. Budgets determine implementation of strategic plans, and provide centralized control over planning by an organization's units. In forest planning, the budget effectively controls plan implementation. The Forest Service budget is also the direct link between **Congress** and national forest management. This section explores the relationship between forest planning and the Forest Service budget by:

1. describing how budgets are considered in forest planning,
2. explaining how planning and the annual budget process are linked, and
3. discussing how funding mechanisms outside the annual budget process affect forest planning and management.

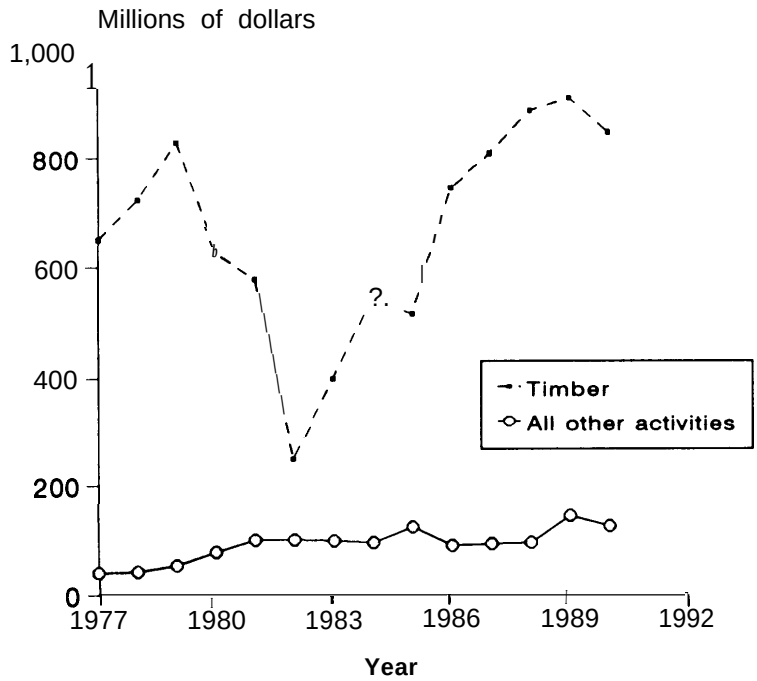
The Budget Level in Forest Plans

Economic efficiency is clearly related **to the** budget level. As described above, neoclassical economic theory provides an approach for determining efficient budgeting if enough information **exists.** However, because of the difficulty of measuring and valuing many government goods and services, such calculations are virtually impossible. Thus, the budget level for each agency and program is determined by political debate and ''horse-trading" to achieve **a** budget level and governmentwide balance that meets the needs of the American people.

There has been an ongoing debate about whether budgets should be constrained in developing Forest Service plans (both forest plans and the RPA Program) (51). The Forest Service argues that budget constraints in the planning process limit the

[2]These payments should not be confused with payments in lieu of taxes (PILT). PILT payments are made by the Bureau of Land Management (Department of the Interior) directly to counties, without restrictions as to their use. They are based on the Federal entitlement acres in the county, but are reduced by other revenue-sharing programs. National forest lands are included in the entitlement acres for PILT payments, and the payments are reduced by Forest Service revenue-sharing, but PILT payments are ***in addition to the*** Forest Service's 25-percent payments.

Figure 8-I-Receipts From Activities in the National Forests (in millions of dollars)



SOURCE: U.S. Department of Agriculture, Forest Service, *Report of the Forest Service* (Washington, DC: U.S. Government Printing Office, annual series).

agency's ability to examine all the needs and opportunities for resource management, and that Congress and the public want to know the professionals' estimate of the money needed to do the job right (214).

However, unconstrained budgets typically amount to "wish lists" (215). In the past RPA Programs, the Forest Service has often implied that, with enough money, they can solve all resource conflicts (147). Furthermore, Congress and the public need information on priorities, on what activities should occur if funding is limited (214, 259). Realistic budget levels are particularly important for forest plans. **The public has spent much time and effort contributing to the plans, and some view the goals and targets in the plans as essentially moral commitments or social contracts (136). If funding is substantially lower than was planned, this contract cannot be fulfilled. Furthermore, substantially lower funding may alter implementation of the planned activities enough to require that the plan be revised.**

Both unconstrained and realistic budget information is clearly useful in planning, but the Forest Service Washington Office gave little direction to the forests on the budget levels to be used in forest planning. One regional office directed the forests to constrain the budget levels used in planning, while others gave no direction. On some forests, planned budgets were constrained by past budgets, but on other forests, the plans were prepared without any budget limitations-whatever money was needed was assumed to be available. Thus, the budgets in forest plans cannot be simply aggregated to a National Forest System budget proposal; the budget assumptions differ too much (215) and may not reflect national fiscal priorities.

Plans and the Budget Process

The Current Budget Process

While NFMA directs that the integrated land and resource management plans be prepared by interdisciplinary teams, the Forest Service's annual budget is not integrated. The House and Senate Committees on Appropriations use more than 50 line items for the Forest Service budget, with each line corresponding to some resource management program. Thus, while planning is integrated, Forest Service

budgeting (at least at the national level) is still done by resource.

Projects under the integrated NFMA plans are aggregated into budget proposals at each national forest, and then the forest budgets are aggregated at the regional offices; integrated resource management is translated into budget line items along the way. The functional budget is modified first by the agency's Washington Office, then by the Office of the Secretary of Agriculture, the Office of Management and Budget, and the House and Senate Committees on Appropriations to meet the political expectations and priorities of each of these participants in the budget process (217). However, the integrity of multiple-use management under integrated forest plans is completely lost in this process, and any relationship between the actual appropriations and integrated resource management is coincidental (138).

The annual appropriations, along with specified output targets,[3] are allocated among the regions, and then to the national forests. Allocations are closely tied to specific resources. The translation of line item appropriations back into integrated management is "done on an ad hoc basis by the resource managers themselves out there on the individual ranger districts" (215).

Allocated funding and output targets thus become the management guidance for on-the-ground management. The accounting for expenditures must, by law, match the appropriations; managers can be held personally responsible for the misuse of Federal funds. The Forest Service does have some authority to transfer funds among programs (technically known as reprogramming), but reprogramming has limited use because:

1. the authority is for relatively limited amounts;
2. the process is time-consuming, but the need may not be known until the field season is under way, late in the fiscal year; and
3. conventional wisdom holds that if money is not used, it wasn't really needed, and won't be available again (i.e., ''use-it-or-lose-it' (215).

Problems and a Possible Solution

The result of line item appropriations and limited reprogr amming opportunity is that expenditures are often reported as they were planned, not necessarily as the money was actually spent (215, 217, 254). Thus, the accounting data may not reflect the way funds were spent managing the various resources. Some of the inaccuracies are intentional, but the imprecision of translating line items into integrated resource projects and then trying to accurately allocate time among the resource line items is the principal culprit (217).

This cost-accounting problem is compounded by inaccuracies in reporting target accomplishment. For commodities (especially timber), the targets are readily measurable, and must generally be met. For other resources, however, the methods for measuring and reporting outputs are less precise and less tangible; watershed accomplishments, for example, are more related to the size of a watershed than to the effort expended (215). (See ch. 6.) As a result, there is ''no recognizable relationship between variations in funding and variations in output" (215). Thus, under the current system of line-item appropriations and accomplishment reporting, Congress and the American people do not really know what they are ultimately buying when money is appropriated for national forest management.

To eliminate these problems, the Forest Service has proposed an alternative budgeting system, known as end-results budgeting. Under this approach, the line items for national forest management would be collapsed into one operations and maintenance account; separate line items would be retained for investments in roads, trails, and facilities, for reforestation and timber stand improvement, and for land acquisition (215). The General Accounting Office (GAO) (251) was favorably impressed with the agency's test of end-results budgeting, finding that expenditures were reported more accurately and that more outputs were being produced without increasing costs.

End-results budgeting is not without its problems. Congress may fear losing control over the budget for each resource program, although this fear is unrealistic, because Congress doesn't really have this

[3]Congress only establishes timber sale targets in the Forest Service's ~@ appropriations, and the regional timber sale targets have only been enacted during the past decade (a response to the below-cost timber sales debate). Other resource output targets are established by the Forest Service Washington Office, based on the enacted appropriations for that resource.

control now if expenditures are reported as planned. Nonetheless, the softness of output measures for noncommodity resources could lead to increased focus on the hard, measurable output targets. (See the discussion of monitoring in ch. 6 and of performance appraisal in ch. 9.) Wilderness, for example, is measured in acres managed, a function of Congress's designation, not of managerial performance. For end-results budgeting to work, accurate measures are needed for changes in the quantity and quality of all resources resulting from management efforts (215, 259).

"Off-Budget" Funding

Special Accounts and Trust Funds

The Forest Service has a number of special accounts and trust funds that are independent of the regular, annual appropriations process. (See box 8-B.) Not all special accounts and trust funds are ''off-budget' some require annual appropriations from Congress to allow money from the account to be spent. However, for several special accounts and trust funds, Congress permanently appropriated adequate funding when the fund or account was created.[4] The Forest Service has 14 permanently appropriated special accounts or trust funds, 7 with annual expenditures exceeding $10 million. In 1987, permanent appropriations amounted to more than a third of the Forest Service budget for the National Forest System (297).

The funding for six of these major permanent appropriations is largely or entirely related to the timber program. As described above, the Forest Service returns 25 percent of its receipts to the States for use on roads and schools in the counties where the national forests are located, and timber usually accounts for 95 percent or more of total receipts. (See also box 8-C.) Deposits to the Knutson-Vandenberg (K-V) Fund are a portion of timber sale receipts, while brush disposal and other cooperative deposits are predominately deposits from timber purchasers for work necessitated by timber harvesting, and the Timber Salvage Sale Fund receives receipts from designated salvage sales. Finally, the Reforestation Trust Fund uses tariffs on wood imports (principally on imports of softwood plywood from Canada) to eliminate the backlog of needed reforestation and timber stand improvement work.

The Forest Service has substantial discretion to determine the amount of money deposited in four of these funds-K-V, salvage, brush disposal, and other cooperative deposits. The agency determines:

1. the portion of timber receipts deposited in the K-V Fund;
2. whether a sale is officially a salvage sale, with receipts deposited in the Salvage Sale Fund; and
3. how much timber purchasers deposit for brush disposal and other cooperative work.

There are virtually no limits on the collections. Deposits to the K-V Fund, for example, accounted for more than *99* percent of timber receipts on the Beaverhead National Forest in 1987, and more than 90 percent of timber receipts *on* eight other forests (298). Nationwide, nearly 20 percent of timber receipts were deposited in the K-V Fund in 1987, including more than $9 million on the Klamath National Forest (47 percent of the forest's timber receipts) and more than $8 million on the Tahoe National Forest (55 percent of the forest's receipts) (298). Deposits for brush disposal and other cooperative work are generally less than deposits to the K-V Fund, but still ranged as high as $7 million each on the Willamette and Mt. Hood National Forests in 1987 (298).

All four of these funds must be used on the national forest where the money was collected (except for the portion allocated to overhead in the regional and Washington offices). Thus, at each national forest, the Forest Service has substantial discretion for determining a large share of its budget, if it has timber to harvest. A distinction is often made between ''rich" forests and "poor'" forests (217). Rich forests simply have more timber available and therefore more special account or trust fund money—than poor forests. (See also box 8-D.)

Within each national forest, the Forest Service also has discretion over how to spend the permanently appropriated funds. Timber salvage funds are limited to preparing and administering new salvage

[4]Technically, the permanent appropriations are not ''off-budget, " because the House and Senate Committees on the Budget must include these appropriations when considering the Federal budget. However, permanent appropriations occur unless Congress acts to alt them, and are generally excluded from discussions by the House and Senate Appropriations Committees and from their committee reports. Since Permanent appropriations occur outside the regular annual appropriations process, they are discussed here as "off-budget" iterns.

Box 8-B—Forest Service Trust Funds and Special Accounts

The Forest Service has 6 special accounts and trust funds that require annual appropriations and 14 with permanent appropriations.[1] (For a more complete description of budget terms and these Forest Service accounts, see *The Forest Service Budget: Trust Funds and SpecialAccounts (297).*) *One* permanent appropriation--National Forest Roads and Trails Fund-has been effectively eliminated by the House and Senate Committees on Appropriations since 1982, because these funds have been transferred to the U.S. Treasury to offset annual appropriations for road and trail construction and maintenance. In addition, a 15th permanent appropriation-the Tongass Timber Supply Fund-waste terminated in the Tongass Timber Reform Act of 1990.

Seven of the Forest Service permanent appropriations are substantial sources of funds, with more than $10 million appropriated annually in each account. The seven major permanent appropriations, in order of 1990 appropriations (257), include:

- **payments to States ($365 million in 1990);**
- **Knutson-Vandenberg (K-V) Fund ($217 million in 1990);**
- **Timber Salvage Sale Fund ($162 million in 1990);**
- Working **Capital Fund ($110 million in 1990);**
- **brush disposal ($47 million in 1990);**
- **other cooperative work ($43 million in 1990); and**
- **Reforestation Trust Fund ($32 million in 1990).**

Six of these seven major permanent appropriations are largely or entirely tied to the timber sale program. The Working Capital Fund is at most indirectly linked to timber, since it is essentially a means of apportioning equipment and other capital costs among the various forest management activities. The one major ($10 million or more) special account or trust fund not connected with the timber program is the Land and Water Conservation Fund (LWCF), which provides money for acquiring recreation lands ($63 million for the Forest Service in 1990). However, LWCF requires annual appropriations from Congress; it is not permanently appropriated.

[1] The difference between special accounts and trust funds, in Federal accounting, is that interest on the trust fired balances accrues to the trust fur@ while interest on special account balances accrues to the U.S. Treasury. There is no difference in the means of financing or in the authority of the agency to spend money from the account.

sales, while brush disposal and other cooperative deposits are only available for the specified tasks that require money to be deposited. However, K-V Funds are available for reforestation, timber stand improvement, or other activities within the timber sale area. In 1990, 53 percent of K-V Funds ($116 million) were used for reforestation, 14 percent ($30 million) for timber stand improvement, and 33 percent ($71 million) for other programs (287). These other programs can include rehabilitation, maintenance, or improvement of watersheds, wildlife habitats, and other resources. Thus, not only timber managers have an interest in the collections and use of these permanent appropriations; this is particularly true of K-V Funds (124, 187).

Implications for Planning and Management

Are permanent appropriations necessary to accomplish various timber management and sale activities? The answer is unclear. The Bureau of Land Management (BLM) in the Department of the Interior manages about 2 million acres of highly productive timberland in western Oregon. While it must accomplish many of the same tasks as its sister agency, BLM has no K-V Fund, no authority to require deposits for brush disposal or other activities, and no purchaser road credits (291). BLM funds road construction and certain timber management activities through direct congressional appropriations or through uncompensated requirements on the purchasers. The productivity and ownership patterns of the lands might make such funding mechanisms adequate, but BLM has demonstrated that such programs may not be necessary to manage lands and sell timber.

No evidence has been presented to show that the permanent appropriations are efficient (for the Forest Service or any other agency). Because the money is available without action by Congress or the administration, permanent appropriations are rarely reviewed. Also, as noted earlier, permanent appropriations are typically excluded from analyses of Forest Service efficiency, and even from reports of

Box 8-C--Peculiarities in Forest Service Payments to States

In 1976, Congress amended the1908 Act establishing permanent appropriations to return 25 percent of Forest Service receipts to the states for use on roads and schools in the counties where the national forests arc located.The counties were concerned that the Forest Service was using timber receipts to pay for reforestation and road construction (see box 8-D, below), thereby redwing the payments tocounties . Therefore, Congress defined Forest Service gross receipts to include certain reforestation funds (i.e., deposits to the Knutson-Vandenberg or K-V Fund) and timber purchaser road credits. on forests with low timber values, these ''receipts" are often the majority of the timber value; for example, deposits to the K-V Fund accounted for 99 percent of timber receipts on the Beaverhead National Forest in 1987 (298). In such situations, Forest Service payments to counties and deposits to the K-V Fund exceed the cash timber receipts, effectively requiring transfers of funds from forests with higher timber values. While the Forest Service has always had sufficient cash timber receipts to cover county payments and K-V Fund deposits nationally, a number of frosts require additional funds to meet these two cash requirements-28 forests (8 in the Northern Region, 10 in the Intermountain Region, and 10 others) with a total transfer of $2.4 million in 1987 (298). However, this interregional transfer is well hidden in the Forest Service budget.

Forest Service expenditures. However, the substantial local discretion over the level and use of these funds prevents Congress from exercising full control over the Forest Service budget. Some might argue that Congress should have limited opportunity to tinker with Forest Service funding; the earlier discussion and analysis of end-results budgeting suggest the benefits and problems of greater agency fiscal autonomy. Nonetheless, whether permanent appropriations are an efficient and appropriate means of funding Forest Service activities remains unclear.

Forest Service permanent appropriations undoubtedly affect national forest planning. As described above, forest supervisors have little direct control over their annua1 budgets for implementing the forest plans. However, they do control the funds available from the permanent appropriations. Furthermore, because at least the K-V Funds are available for a variety of tasks, employees in many resource specialties have a budgetary interest in supporting timber sales. Some critics have even suggested that Forest Service management is driven primarily by efforts to the budget (124, 187). The use of K-V and other funds on some forests does lend credence to this view, but managers on other forests apparently rely much less on these funds. Thus, budget maximization is certainly not the sole motive of Forest Service employees. Nonetheless, budgetary considerations do support an internal interest in maintaining or expanding the timber sale program in national forest planning.

SUMMARY AND CONCLUSIONS

Economic considerations enter national forest planning primarily as concerns about the balance among resource values, about management efficiency, and about the impacts of national forest management on communities. RPA and NFMA require various economic analyses, and MUSYA directs management to consider 'the relative values of the various resources. " These laws clearly indicate that efficiency is an important consideration, but not the principal criterion for management decisions.

The Balance Among Resource Values

Some have suggested that efficiency is the appropriate standard for determining the balance among resource outputs and environmental protection. Efficiency is generally evaluated by comparing benefits (social benefits generated by a government agency) with costs (including nonfinancial costs). To analyze investments, current and future benefits and costs are compared by calculating the present net value of the investment. The Forest Service uses a computer model--FORPLAN--for such analysis. As described in chapter 7, this model maximizes the present net value of the specified objectives, subject to various constraints.

FORPLAN is a useful tool for examining the efficiency of management alternatives, but has limited capability to determine the most efficient management balance. First, many uses and outputs of the national forests are not marketed, and the existing techniques for valuing unmarketed uses and outputs might not provide values that readily compare to market prices. Furthermore, the FORPLAN objective function includes only uses and outputs; nonuse values of the forest (option, bequest, and

Box 8-D—Timber Purchaser Road Credits

In addition to the various special accounts and trust funds, the Forest Service has a unique means of funding road construction in the national forests. Under the 1964 Forest Roads and Trails Act, the Forest Service can require purchasers to build the roads specified in the timber sale contract. The law also allows the agency to compensate the purchasers, which it does by granting credits equal to the estimated construction costs. These credits can then be used to pay for the timber that is harvested, before any cash must be paid. Purchaser road credits can be viewed as short-term, interest-free loans for buying Federal timber, although purchasers see them as reimbursement of required expenditures. In 1987, the Forest Service granted nearly $120 million in road credits, including $12 million on the Willamette National Forest and $9 million on the Umpqua (298). Furthermore, purchasers can transfer the credits among timber sales within a given national forest (but not between forests or between purchasers), essentially allowing them to extend the term of this interest-free loan.

In some circumstances, the timber purchasers cannot use their credits. The Forest Service specifies the minimum cash payment for each tree species in each sale, based on regional standards. If using the credits would reduce the purchaser's cash payments below the minimum, some or all of the credits cannot be used.[1] (Such unusable credits are called "ineffective" road credits.) This situation is most likely to occur where timber values are quite low, such as the northern and central Rocky Mountains. Timber values can be low, because the trees are smaller in diameter and occur in more scattered, less dense stands, or because the purchasers face higher operating costs. The low timber values and low timber volumes typically mean fewer and smaller sawmills, and thus probably less efficient, and possibly less profitable, operations.

The existence of effective and ineffective credits is important, because it also distinguishes between "rich" and "poor" forests. The credits are less likely to be effective in forests with low timber values, and purchasers of timber from these forests are at a disadvantage because they are less likely to have access to the short-term interest-free loans.[2] Thus, forests with low timber values are less likely to be able to sell timber, and therefore have fewer opportunities to fund road construction and the various special accounts and trust funds that provide a significant portion of the budget.

Furthermore, the current system of effective and ineffective credits is unfair to purchasers, because operators in certain areas often cannot use their credits. Congressional efforts at providing a more balanced system have focused on allowing ineffective credits to be transferred (or sold) to other forests and/or other purchasers. However, such a move could cost the government money; estimates of ineffective credits range as high as $100 million annually. In addition, purchasers of Bureau of Land Management timber (and probably of private timber) would still not have access to purchaser road credits. Nonetheless, the current system is unbalanced and does not treat all timber purchasers fairly, as equals in their chosen business.

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[1] Purchasers in such situations are also less likely to face competition in bidding for Forest Service timber, however, and the fewer bidders generally means less overbidding and therefore *a relative price advantage.* Purchasers can *mill poorer* timber *and face* higher operating *costs without* necessarily being less profitable

[2] In such situations, purchasers can bid up timber prices by the amount of the ineffective credits without increasing the required cash payments. such bids, sometimes called "wooden dollar", bids, anew purchasers to delay their cash payments by making the Credits effective (usable). "Wooden dollar" bids also increase Forest service payments to counties (see box 8-C, above), and thus have a detrimental &&x on the Us. Treasury.

existence values) can only be included as constraints onuses and outputs. FORPLAN analyses are only as good as the information in the model, and thus are restricted by incomplete knowledge of biological interactions, by sparse data on noncommodity uses and outputs, by model limitations for addressing spatial relationships, and by inadequate analyses of the efficiency of the management prescriptions used. Finally, investment efficiency may require that future investments be tied to current expenditures, but Congress is reluctant to commit to expenditures by future Congresses.

In addition to these limitations on using efficiency criteria generally, and FORPLAN in particular, to determine the management balance for the national forests, Congress and the public have rejected efficiency as the standard for determining management direction. Furthermore, the beneficiaries of many management activities pay less than the full cost of producing the benefits, and some pay little or nothing. The Forest Service has implicitly recognized these limitations in selecting forest plans that do not maximize present net value. Instead, the balance among uses, outputs, and protection can

only be determined through public involvement-as the Forest Service and the public discuss their needs, concerns, and values and consider the possibilities of achieving them through national forest management (See ch. 5.)

The Impacts of Management

The impacts of national forest management on communities are typically addressed in terms of community stability. Congress has long expressed concerns about community impacts, but the legislative direction to consider community stability in forest planning is ambiguous. Nonetheless, forest planning is to address local concerns, and locals are often concerned about the impacts of management on their communities.

The Forest Service generally uses an input-output model—IMPLAN--to identify the economic impacts of management alternatives. IMPLAN estimates the employment and income by industry sector for multicounty areas around each national forest. However, this approach can mask impacts on specific communities, because different resource-related firms may exist in separate communities within a county. Furthermore, the wood products industry is the only resource-dependent industry identified as a separate sector in Commerce Department data; although the Forest Service is working to improve IMPLAN, modifying the data to separate recreation, livestock, and other resource industries is an expensive and time-consuming task. Finally, the imprecise definitions of community and of stability limit the agency's ability to fully display the impacts of national forest management.

Traditionally, community stability has been equated with sustained yield, particularly of timber, but no evidence exists to show that sustained yield or timber management can promote community stability. Furthermore, the Forest Service has no ability to influence demand factors, which are important to stable industry production, and it is questionable whether the Forest Service alone bears responsibility for timber industry stability. Nonetheless, abrupt changes in Forest Service timber sales can be disruptive. Thus, the Forest Service has defined its responsibility to communities as attempting to avoid causing radical or abrupt shifts in local social and economic patterns.

An additional significant impact of national forest management is the potential effects on county budgets. **The Forest Service returns 25 percent of its gross receipts to the States for use on the roads and schools in the counties where the national forests are located. In most years, more than 90 percent of Forest Service receipts result from timber harvesting. Thus, to meet budget needs, counties often support continued or expanded timber harvesting. This is also a problem, because timber receipts can fluctuate by 50 percent or more from year to year. Counties need to be fairly and consistently compensated for the tax exempt status of the national forests (and other Federal lands), but the current system might not approximate tax compensation.**

Planning and Budgeting

The budget may be the most important economic concern in forest planning and in plan implementation, but the current budget system has serious defects. Various national forests used different budget assumptions in preparing their plans, some constraining the budget to realistic alternatives and others allowing any budget level. Because of this, current forest plan budgets cannot be simply aggregated into an annual budget proposal for the National Forest System. Unconstrained budget assumptions are useful for examining a full range of opportunities, but realistic budgets are necessary for displaying priorities and likely management activities to Congress and the public. Although difficult to achieve, both types of budget assumptions should be considered in planning.

Another problem is that the current budget system subverts the integrated resource management required by NFMA. More than 50 functional line items appear in the annual budget, with the funding and output targets modified by the Forest Service Washington Office, the Secretary of Agriculture, the Office of Management and Budget, and the House and Senate Committees on Appropriations. The resulting appropriations bear little resemblance to the integrated management presented in the forest plans. In the field, the allocated funds and targets are retranslated back into integrated projects, but the allocations may not match the plans very closely.

This process leads to inaccurate reporting of costs and accomplishments. Despite direction to report expenditures accurately, they have often been reported as they were planned, without assurance that actual expenditures match the plan. Furthermore, while hard, measurable outputs are reported for

commodity resources, the measures used for other resources allow for substantial imprecision in reporting. (See ch. 6.) The Forest Service has proposed "end-results budgeting' to eliminate these problems, and the General Accounting Office has found the test to accurately report expenditures. However, measures that relate management efforts to changes in resource quality and quantity are needed before end-results budgeting can take into account all resources.

Finally, permanent appropriations account for nearly a third of the Forest Service budget annually. Most of these special accounts and trust funds are related to the timber program, deriving money from timber sales and/or providing money for timber management activities. Each national forest has substantial discretion to determine the amount of money available in several of these accounts, and in one, the K-V Fund, the money can be used for any management activity in a timber sale area. However, the BLM operates without permanent appropriations in western Oregon, suggesting that they may not be necessary. No evidence has shown that permanent appropriations are efficient, and there has been virtually no congressional oversight or control over these discretionary funds. Nonetheless, these permanent appropriations clearly can influence national forest management, because managers have the opportunity to increase their own budgets by increasing timber sales.

Chapter 9

Organizational Factors in Forest Planning

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Chapter 9
Organizational Factors in Forest Planning

In some respects, the Forest Service appears to be under siege even by some of its own employees. The plans and the planning system are being attacked, and the agency is accused of damaging the resources and ecosystems it is mandated to protect. One common allegation is that the agency's problems result from the dominance of professional foresters. Others assert that the problems arise from the unbalanced reward system for agency managers. This chapter examines these allegations, and concludes by assessing the impacts of organizational factors on forest planning.

PROFESSIONALISM AND DIVERSITY IN THE FOREST SERVICE

This section explores the strengths and limitations of the agency's forestry-oriented professionalism, examines diversity and the use of interdisciplinary teams, and concludes by assessing organizational and employee values.

Professionalism

Foresters

Foresters have dominated the ranks of the Forest Service from the very beginning. Bernard Fernow, Gifford Pinchot, and others emphasized the importance of professional forestry training for those who manage forested lands, and focused on hiring foresters for the agency (240). Today, professional foresters are less dominant than in the past, but foresters still account for more than 50 percent of professionals and for more than 75 percent of the technicians employed by the Forest Service (284).

Foresters, as any professional group, are bound together by a common educational core and professional identity. The professional foresters organization—the Society of American Foresters (SAF)--contributes to this cohesive identity by providing the focus for professional activities and by accrediting forestry school curricula. This assures that forestry graduates are schooled to meet the needs of the Forest Service and the forest industry, the major employers of foresters. An interlocking network of agency-university-industry establishes a successful paradigm of scientific forest resource management (316, 330). This paradigm emphasizes resource use and has implications for the direction of forest planning.

Emphasis on Use—The extent to which foresters do and should emphasize timber production has been debated for more than 50 years (31). SAF Executive William Banzhaf (12) recently noted the current SAF president and vice president reflect the diversity among foresters in differing over "the level of emphasis we as professional foresters should give the production of wood for commodity uses.'

Wood production is an important part of national forest management and of professional forestry. Timber management has traditionally been at the core of a forester's training.

> In the United States, foresters were initially educated to be custodial managers with heavy emphasis on timber production, an educational philosophy that persisted for some 40 to 50 years (71).

Two decades ago it was alleged that:

> The professional forester apparently accepts . . . the belief in the primacy of timber as a use of the forest, based on the fear of a wood famine, *inter*-woven with a puritan ethic that utilitarian or commodity uses are always more important than any amenity values (29).

Foresters are the only professionals who have the education and experience to manage forests for wood production-they are the only ones who can be the timber specialists (53). Thus, foresters must be concerned with timber production.

This is not to suggest that foresters are all 'timber beasts," with no interests other than maximizing wood production. The forestry profession has long endorsed the concept of multiple-use management, and foresters in the Forest Service have recognized multiple uses of forest lands since the Gifford Pinchot era(131, 330). Wood production is only one of the many forest uses, albeit an important one, but managing trees is critical to many forest values, such as aesthetics, water flows, and wildlife habitat. Furthermore, forestry education exposes foresters to

all the various forest resources, and many foresters have additional training in other resource specialties.

Nonetheless, foresters typically emphasize use of the resources. The SAF Code of Ethics, for example, focuses on forestry as practices, rather than on forests as natural systems, and on management of forest resources, rather than of forests (209):

> . . . foresters' traditional view of themselves [is] as managing *resource things* (i.e., objects like trees or game animals), rather than managing these resources as objects of changing social values (including non-consumptive and symbolic values) (129).

Some of the emphasis on uses comes from the Gifford Pinchot tradition of unbiased, professional management of the public's lands. Prices (or other measures of use value) are quantifiable, objective, and unbiased indicators of public preferences, and foresters prefer ''neutral' economics for assessing social value over direct, emotional, face-to-face, unquantifiable expressions of social value at public hearings and political demonstrations (128). However, economics has developed better techniques for valuing unpriced or subsidized uses and outputs than for valuing nonuse benefits of forests. (See box 8-A, p. 145.) Thus, foresters (and economists) unintentionally emphasize use of forest resources over other forest values.

Implications for Forest Planning—The emphasis on forest uses has merit in national forest planning. People care about the forests, and whether and where to cut trees are central to much of the debate over forest management. Thus, in some respects, foresters' emphasis on uses addresses public interests and concerns. However, some forestry educators believe that foresters' commitment to the public interest has diminished:

> A strong commitment to . . . the public good was central to the forestry profession in this country during the first half of this century. More recently, however, this commitment appears to have declined both within the profession and in the eyes of those outside it (71).

Why do some believe that foresters' commitment to the public good has declined? Some foresters have asserted that society has changed, and the profession is no longer in tune with social values. For example, Scott Wallinger of Westvaco Corp. (3 10) noted that:

> What is changing rapidly is not the validity for forest practices but the values most of the public uses to judge them . . . Current logging is heavily unbalanced toward just one system [clearcutting] . . .

William Ticknor of Mead Corp. (249) similarly observed:

> . . . the public is saying, "Even, when I understand what you are doing, I *still don't like it."*.
>
> There is no debating matters of taste. You can't persuade a person to like broccoli, Penn tennis balls or clearcutting. Or, preferring seedlings to mature trees.

Others have noted that America is becoming more urban and our urban society views nature more romantically (26, 106). Urbanization has broken many of the direct ties with utilization of nature, and thus has led to the more romantic, less utilitarian view of nature. Furthermore, this is not a social change that can be corrected by ''educating the public. They know what they like, and are unlikely to accept traditional justifications for standard forestry practices that have undesirable effects on the nonuse values of the forests. This implies the need to do things differently. Again, Scott Wallinger (310) observed that:

> . . . we [foresters and the timber industry] must adjust to changes in public and landowner values and attitudes, not just defend traditional ways.

And William Ticknor (249) added:

> . . . I think we [foresters] will find it useful to put aside the ''we-they" mentality as we approach our task, and acknowledge that we, as a society, want to approach forest resource management differently in the future than we have in the past.
>
> . . . it is inevitable that forest practices, as we know them today, are going to change.

Other Professionals

The Forest Service may still be dominated by foresters, but the agency has always used other professionals as well, and these are becoming a more significant part of the agency's personnel structure. The Forest Service has traditionally employed numerous engineers, with range conservationists, soil scientists, hydrologists, economists, and other specialists. Engineers are still important, accounting for more than 10 percent of the professional workforce and nearly 20 percent of the technicians (284). Forest Service engineers are relatively similar to foresters in their view of the agency mission, decision criteria, and disagreements with the organi-

zation, although they tend to place greater emphasis on cost efficiency than do foresters (33).

In addition, over the past 20 years, the Forest Service has added or expanded to include other professionals, largely in response to the National Environmental Policy Act (NEPA), the National Forest Management Act (NFMA), and various other laws governing the management and/or protection of the national forests (l). Wildlife and fisheries biologists have become the second largest professional group within the Forest Service, accounting for nearly 15 percent of the professional staff (286), but the agency also has landscape architects, archaeologists and anthropologists, and various other professionals.

> The agency has developed a strong cadre of professionals in each of [the important resource] areas (146).

Biologists have become a significant professional subculture within the agency, ranking with engineers in numbers (33, 132, 133). While biologists have much in common with foresters, they also differ in several ways. Education in biology, not surprisingly, focuses on biological and ecological processes. In contrast to forestry, biology has not had an industry to employ its graduates, and does not have the lengthy historical focus on land management. Thus, biologists in the Forest Service typically have a more biocentric, less utilitarian view of forest resources than foresters have (33).

Other specialists within the Forest Service have their own educational emphases, Landscape architects, for example, emphasize visual values, while archaeologists and anthropologists are more likely to be concerned with cultural values. However, regardless of their training, most of these various specialists share with foresters, engineers, and biologists a sense of professionalism, and undergo rigorous education and training in their specialty.

Benefits of Professionalism

Perhaps the greatest benefit of Forest Service professionalism has been the agency's long history of success. For more than half a century, the Forest Service was viewed as a premier Federal agency, being a relatively strong and independent entity in managing resources for the public good. Shortly after the passage of the Multiple-Use Sustained-Yield Act in 1960, one observer wrote that:

> . . . the Forest Service has an *esprit de corps* and a professional dedication unmatched in federal service which should not be damaged. The present fine condition of the national forests is a monument to the devotion and ability of the Forest Service and this is an important factor in any decision about the appropriate scope of professional responsibility.

Others have noted the traditional view of district rangers as local heroes (130) and the Forest Service as a hero-agency (128). Few would argue that the Forest Service had a long tradition of management with relatively little public challenge to its authority or direction, at least until the 1960s.

The Forest Service's professionalism and history of success (as measured by the lack of major public challenge to management direction or authority) have contributed to the agency's unusual esprit de corps. However, it may stem primarily from the homogeneity and shared perceptions of the foresters who have dominated the agency (50). Regardless of the source, Forest Service employees have had a consistent sense of mission matched by few Federal agencies.

Preserving this strong sense of mission is the key to maintaining the historic esprit de corps of the Forest Service. Some employees are concerned, however, that the management direction for the national forests is not consistent with the current motto "Caring for the Land and Serving People. " Forest supervisors have been particularly outspoken in recent years about actions they perceive to be inconsistent with the agency's mission (90, 91).

Drawbacks of Professionalism

While professionalism has contributed to the long history of Forest Service success and esprit de corps, it also has drawbacks. The scientific conservation paradigm (see below) limits the ways in which professionals interact with the public, and public trust in professionals has declined. These criticisms have been directed principally at foresters, largely because of their historic dominance of the Forest Service, but apply to all of the professionals employed by the agency.

The Scientific Conservation Paradigm—The scientific conservation paradigm essentially presents conservation as primarily a scientific effort, with a focus on correct technical practices and procedures. This view was behind conservation efforts of the mid-1800s, and persists largely

through the education of foresters, biologists, and other professionals in scientific and technical matters (330). Foresters are traditionally taught to be objective, scientific managers (131), and ''forestry education emphasizes specialization, skill in quantification, and rational problem-solving approaches" (315). Furthermore, the sciences (in contrast to philosophy) typically eradicate disproven theories from their texts, leading students to view their education as the correct way of doing things (159).

This emphasis on technical matters creates numerous problems for the Forest Service in dealing with the public. The agency has been accused of ''groupthink," whereby cohesive groups (e.g., foresters) view problems and potential solutions similarly (130), leading to insular and inflexible approaches (50). Such cohesiveness limits the individual's ability to explore new solutions and opportunities (161).

The technical emphasis also contributes to public perceptions of arrogance and aloofness (130). Foresters and other resource professionals are notoriously weak at interpersonal relationships: "many professionals are reluctant to interact with 'nonexperts, ' those who are not members of their professional subculture' (315). "Groupthink" among professionals often results in unconscious or indirect censorship of contrary or disquieting information (130); "listening [to the public] seems to occur without hearing' the message (159).

Finally, the technical emphasis leads professionals to believe that they know the correct way of doing things. This belief has been described in terms of the traditional professional-client relationship, with the client simply accepting the professional's decisions:

> In the traditional professional-client relationship, the professional's expertise is wrapped in mystique, and the client accepts the professional's authority and agrees not to challenge his judgment or demand explanation (316).

The public is considered to be uninformed, and the professionals are " 'uniquely qualified' to make natural resource decisions' (159). Foresters and engineers have been most likely to object to agency decisions when they felt that politics or the public was interfering in sound management (33). Furthermore, physical and biological scientists are more likely to discount the public's knowledge than are social scientists (economists, sociologists, etc.) (237). Foresters typically accept scientific answers, and reject emotional ones:

> The argument is that in our [foresters'] special need to achieve scientific validation of everything, we have invalidated most everything that we find science cannot examine. In the process of second-rating all that is not "scientific' we have devalued romantic, emotional, and intuitive insights. We have trained hard to distrust those voices in ourselves and others, lest they prove to be unsound (106).

This is not to suggest that technical information is not important in forest planning. Indeed, technical analysis is essential, but it is not enough.

> Technical competence is a necessary but not a sufficient condition for success in public forest resource management (316).

In its recent critique of land management planning, the Forest Service noted that it began the process expecting to find the ''right' scientific answer for how to manage the national forests (276); the critique concluded, however, that many technically correct answers exist for land management, and that the public should be involved in determininggg which of the technically correct answers is most desirable socially.

> The problem is not so much public ignorance of resource management as professional ignorance of the public (159).

William Ticknor (249) described the situation this way:

> Traditional forest science is the essence of a left-brain endeavor. . . analytical, quantitative, logical, linear. Most of us who are practitioners are so because that's the way we were trained, and because we enjoy and excel at left-brain pursuits.
>
> But the solution to our problem, I propose, is to move toward a more intuitive, multidimensional approach which places a high priority on blending the not inconsiderable scenic, aesthetic and spiritual aspects of forestry with the biological and business aspects.

Decline in Trust of Professionals-Several authors have noted that the decline in public trust of foresters is not unique. Society appears to have less trust for all professionals (1 12, 158), including those in other government agencies, such as the National Park Service (316), and outside the government. The list includes lawyers, engineers (121, 315), and

doctors, as indicated by the rising cost of, and need for, medical malpractice insurance.

Some have suggested that part of the problem is the lack of public consensus about the proper management of the national forests (158). One observer wrote:

> We [foresters] do have a difference of opinion within our ranks (which mirrors society) about how lands should be managed . . . Our image will never return to its previously untarnished sheen because our increasingly complex and strident society cannot form a single vision of what it seeks. Probably the best we can hope for is an uneasy consensus (95).

Thus, it seems that the public is simply less willing to accept the knowledge and expertise of professionals in deciding what to do about public issues.

Diversity and Interdisciplinary Efforts

Change in the Forest Service

Change is occurring within the Forest Service. Although it is still predominately a white, male organization (more than 50 percent of all employees and nearly 75 percent of professionals are white males), the number of women and of minorities doubled between 1976 and 1989 while total employment climbed by only 20 percent (284). Furthermore, as noted above, the dominance of foresters is declining as the agency adds biologists, landscape architects, archaeologists, anthropologists, and other specialists.

The change is not problem-free. The Forest Service has been successfully sued in California (Region 5) for its slow development and promotion of female employees. The addition of numerous planners and computer specialists for using FORPLAN and preparing the forest plans has caused culture shock—both to the traditional employees and to the new recruits (146). Organizations have a strong, innate tendency to exclude ''outsiders' the Forest Service's history of success, for example, has led to ''resistance to incorporating the nonutilitarian, amenity values of a post-industrial urban nation . . . and a manifest reluctance to share power with the public and with other professionals" (130).

> We [foresters] are fond of saying our diversity is our greatest strength, but right now it really isn't. The way many of us are going about our business is bringing us to denial and intolerance instead. If diversity is going to be our strength, then we need to find a way to face our differences and respect them (105).

A study of attitudes based on educational and gender differences found that, a female forester is much more like a male forester than a male biologist is like a male forester. "[M]ost of the job frustration and prejudice women and men experienced were related to their [wildlife and fish biology] profession confronting traditional timber-range chauvinism' (132). Gender diversity is important for many reasons, but educational diversity is more important in terms of diversifying ideas and opinions.

Benefits of Diversity-Increased diversity within the Forest Service can yield several benefits in forest planning and public involvement. A diverse workforce brings a broader array of ideas, leading to greater creativity and flexibility for the organization. "Professional monoculture" resist change (132), and often unconsciously or indirectly censor information that contradicts insider views (130). Five out of six Forest Service interdisciplinary (ID) team members felt that "ID teams foster a holistic approach to problem-solving" (94). Furthermore, "creativity in environmental problem solving is a group activity that involves inputs from many different fields" (94).

Workforce diversity also can improve public involvement. Various segments of the public prefer different kinds of involvement in activities and decisions (159, 231). A diversity of professions, ages, and genders provides more avenues for various groups to be heard.

> Diverse disciplinary backgrounds and generational differences create centrifugal forces that provide access to sympathetic decisionmakers by a broad range of groups (237).

Finally, diversity also provides a broader spectrum of values among agency employees (133). One reason for using interdisciplinary teams is ''to overcome the narrowness of a single professional focus" (94). Foresters tend to focus on utilitarian values, and downplay the spiritual, symbolic values of the forest (128, 209). Biologists, in contrast, place greater value on biological processes (33), and these ecological values are more akin to the intrinsic values our substantially urban society holds for forests (194, 209). By combining the variety of values of a diverse workforce in its planning and management, the Forest Service could generate broader support for its activities and plans.

Costs Costs of Diversity--Increasing workforce diversity also imposes costs on the Forest Service. One major cost is increasing internal conflict. To the extent that the conflicts are professional differences about technical matters, such conflicts can be beneficial, fostering creativity and flexibility. However, many of the differences occur because nontraditional employees are challenging the traditional assumptions and operating styles, and thus become "change agents" within the agency (130). Challenges to "standard operating procedures" are often viewed as disloyalty to the agency, and can damage career prospects (104, 132). Sometimes the differences among staff devolve into personal conflicts (94), and can be very disruptive.

It is also difficult to build a team from a collection of diverse individuals. Time is required to overcome distrust of other professions and to abandon the resource advocacy roles many employees must employ during budget negotiations (94). ID teams still often operate as a collection of advocates rather than as a team:

> Consensus is not the norm on most interdisciplinary teams; rather the relationship among most team members is adversarial and, in some cases, antagonistic (13).

Frequent changes in interdisciplinary team membership complicates the task of fostering teamwork, as employees are hired, transfer to other positions or locations, or leave the agency. In addition, some ID team members have only part-time team duty and many nonteam duties (94). Thus, building an effective interdisciplinary team is a difficult and challenging task.

Strategic planning can overcome some of the problems of workforce diversity. If a strategic plan establishes a sense of mission that is consistent with the values of the employees, and of the public, all of the diverse elements of the agency can be brought together to implement the plan. As noted above, a strong sense of mission can rekindle the esprit de corps that has traditionally been one of the Forest Service's strengths. However, this entails more tolerance of diverse opinions and of challenges to traditional practices. Moreover, achieving a unity of mission and sense of teamwork is a time-consuming process.

Use of Interdisciplinary Teams

The use of interdisciplinary teams in national forest planning is mandated by NFMA and NEPA. However, the functional organizational structure has inhibited integrated forest planning. As noted in ch. 7, FORPLAN has in some ways forced the various specialists to learn to talk a common language (123, 278), but it also has contributed to advocacy by the various specialists (13). Furthermore, when debates become "use versus nonuse" (rather than how to achieve all relevant values), they can polarize both internal and external groups (160). FORPLAN creates other barriers for many employees who are not on the planning team, and thus can separate planners from managers and other employees (23). Nonetheless, to the extent that teamwork can be created, ID teams can lead to more effective, coordinated planning (94).

Most ID teams used in national forest planning include specialists in wildlife, timber, recreation, engineering, hydrology, soils, economics, range, and a plethora of other disciplines. (See table 9-l.) Many of these specialists have college degrees in their area of specialty (94). However, some specialties are represented by employees trained in other areas. For example, foresters dominate the recreation, hydrology, and economic specialties (94). This does not necessarily mean that these people are unqualified to perform the necessary tasks, since many foresters have additional training in other disciplines. Nonetheless, to the extent that foresters are used in an assortment of specialty roles: 1) the benefits of educational diversity will not be achieved, and 2) foresters may lose the special characteristics that make them a distinct profession. Some forestry educators have noted this as a possible problem:

> . . . as foresters fill evermore varied assignments, the term forester has lost much of its former meaning, and an identify crisis exists for the profession (71).

The Forest Service is not required to use ID teams except in planning, and ID team outside planning use has been rather limited. Several forests, such as the Allegheny in Pennsylvania and the Lolo in Montana, have apparently reorganized away from the traditional resource functional approach. However, the Forest Service is still generally organized by resource function, especially at the regional and national offices (276). Furthermore, despite the importance of teams and teamwork, Forest Service

Table 9-l—Forest Service Interdisciplinary Team Members

Specialty	Interdisciplinary team use (percent)	Degree in specialty (percent)		Degree in forestry (percent)	Degree in other (percent)
Wildlife	91%	80%	*(biology)*	4Y0	*6%*
Timber	89	95	(forestry)	95	*5*
Recreation	76	40[a]	(recreation)	52	*8*
Team leader	75	2	(planning)	64	*34*
Engineering	74	90	(engineering)	2	*8*
Visual quality	73	97	(landscape architecture)	0	*3*
Hydrology	69	46	(hydrology)	46	*8*
Planning	64	0		71	*29*
Soils	64	78	(soil science)	10	12
Program analysis	59	4	(computer science)	56	40
Economics	58	24	(economics)	40	36
Range	54	47	(range conservation)	31	22
Fire	52	0		82	18
Public involvement	47	51	(social science)	41	8
Lands	41	0		88	12
Archeology	38	8 9[b]	(archeology)	0	11
Fisheries	30	80	(biology)	0	20
Writing	27	21	(English)	29	50
Sociology	23	41	(sociology)	0	59
Geology	13	82	(geology)	0	18

[a]Includes landscape architecture (37 percent of the total).
[b]Includes anthropology (68 percent of teetotal).

SOURCE: M.W. Garcia, "Forest Service Experience With Interdisciplinary Teams Developing Integrated Resource Management Plans," *Environmental Management13 (5):583-592, 1989.*

success is still symbolized by the "heroic district ranger":

> Although agency guidelines .. . are stressing the importance of teams working together in cooperation with other organizations and the public, the traditional image of the strong, heroic individual still has considerable symbolic potency in the Forest Service (131).

The resource functional approach to national forest management is particularly a problem for budgeting. As discussed in chapter 8, the forests develop budget requests based on their interdisciplinary forest management plans, but these integrated requests are translated into resource functions, to meet the current requirements of the administration and the House and Senate Committees on Appropriations (217). Actual appropriations are then allocated to the forests, with substantial discretion vested in the regional resource staffs (217). Resource specialists at the national forest level must compete for funds with comparable specialists from other forests and with other specialists on their own forest. Thus, the current budget process inhibits an interdisciplinary or integrated approach to project planning and implementation.

Organizational and Employee Values

Successful organizations in American business have distinctive corporate cultures that contribute to their success (195). Those corporate cultures typically provide both the stability needed by organizations and their employees and the ability to evolve as the needs of customers (and society) change. Stability is provided by the formal structure-the laws, rules, and regulations governing the organization—and by informal rules and internal goals (50). Providing for evolution is much more difficult, but is a key to success in business (195).

Many observers have considered the Forest Service to be among the best of Federal agencies (109, 128, 250). The agency certainly has a distinct culture that has provided stable direction for the national forests for many decades. Evolution in response to social changes is more problematic. Some have argued that the Forest Service has not responded to changes in social values (161, 310, 320). However, others suggest that the Forest Service has been more effective than other agencies at evolving to meet the requirements and intent of NEPA (1), and has at least recognized the broad mandate for national forest management:

> To their **credit, the principal public land agencies, the Forest Service and the Bureau of Land Management, have been seeking larger roles for wildlife on the millions of acres in their charge (197).**

Recent research has examined employee perceptions of agency and personal values, and found substantial differences. The following sections describe apparent organizational values and employee values, and explore the reasons for the differences that have been found.

Organizational Values

Many Forest Service critics have alleged that the agency is biased toward timber production (66, 104, 187). A survey of employees found that employees also believe that the agency values timber more highly than other resources; other resources are valued equally among themselves (133, 250). The belief in timber's primacy is also reflected in the recent letters from forest supervisors to the Chief of the Forest Service asserting that current programs are not consistent with proper land stewardship (90, 91). This belief permeated the agency, from new employees to forest supervisors, and even to top management (regional foresters and the Chiefs office) (133).

Others who have examined the Forest Service conclude that agency actions reflect an inherent bias not toward timber, but toward maximizing its budget (124, 187). O'Toole (187) in particular has suggested that the agency only appears to emphasize timber production because of the numerous special budget accounts associated with timber harvesting. (See ch. 8 for a discussion of these accounts.) Another study suggests that the reliance on standard procedures and the civil service protections from political interference account for the agency's efforts to maximize its budget (213). Despite their logic and some evidence to support these arguments, other evidence suggests that the Forest Service has not taken full advantage of the opportunities to exploit its special budget accounts (298). Thus, the budget maximization hypothesis is insufficient to account for Forest Service values and actions.

Studies have shown that Forest Service employees believe the agency primarily values productivity and team spirit (132, 133). Productivity includes meeting targets, working hard, and being competent, while team spirit includes loyalty, teamwork, promoting the Forest Service image, and getting along with your peers (133). Team spirit is clearly important to the Forest Service and its traditional esprit de corps. Displaying behaviors consistent with agency values is considered pivotal for success in the agency (131). This belief, along with the perception that the agency values timber over other resources, is widespread among the employees, with little difference by gender, professional background, or level of experience and responsibility (132, 133).

Such views are not inappropriate, but can have unintended consequences. One potential problem is that, although the agency's "New Perspectives" is an attempt to encourage internal change, challenges to traditional practices and procedures are often perceived as disloyalty (130). This is more likely to be a problem for nontraditional employees, such as biologists and landscape architects, and could hinder the agency's ability to adapt to changing social values. Another potential problem is the message to new employees-' 'don 't make waves' and ''go along to get along" (104). While such messages are important to team spirit, they can inhibit employees from speaking out and thus inhibit challenges to traditional practices and procedures.

Employee Values

In many respects, employee personal values differ from the organizational values of the agency. Forest supervisors have noted that their values and those of their employees have been changing (90). In contrast to the agency's apparent emphasis on timber resources, employees report that they value recreation higher than other uses, followed by wildlife and then water (133). Again, this is true for employees at all levels in the agency, even top management (regional foresters and the Chief's office). These values, moreover, matched employee perceptions of the public's values. Thus, employees believe that the agency values timber relatively more than either they or the public does.

Employees also believe that the agency should reward additional behaviors. Professional competence, hard work, and teamwork are and should be rewarded, but employees believe that concern for healthy ecosystems, for the long-run future, and for the welfare of one's peers should also be rewarded (133). Again, employees at all levels shared similar beliefs about what the Forest Service should reward.

Why Are There Differences?

One might hypothesize that differences between organizational and employee values exist because new employees differ from experienced employees. Differences do exist-new employees are older at the beginning of their Forest Service careers, they are more likely to hold advanced degrees, and more are biologists and fewer are foresters (133). However, as noted above, these differences did not lead to differences in opinions about agency and personal values. The letters from the forest supervisors to the Chief also suggest that the managers' views are relatively consistent with those of their employees (90, 91). In fact, some of the long-time employees have been among the leaders in supporting Forest Service changes:

> . . . many of these senior people have become adjusted to the challenges and promise of the post-NEPA era, and have supported and authored innovative approaches . . . (130)

Thus, it seems that increasing diversity is not the source of the differences between agency values and employee values.

Some differences probably occur because of the tradition and inertia common to large organizations. The Forest Service certainly has along and respected tradition (13 1), and it is difficult to change comfortable and successful modes of operation (161). The Forest Service has also institutionalized its traditional practices through common training, promotion from within, and regular transfers (250). Some argue that historic patterns persist because of procedural standards and civil service protections for government employees (213). Finally, the idea that change is necessary also implies that traditional practices represent the wrong way to do things (1 1). Despite the clear changes in social values, it is difficult to distinguish the appropriateness of past procedures for their era from the current relevance (or irrelevance) of such procedures.

The various external pressures on the Forest Service also limit the ability of the agency to alter agency values. External constituencies-' 'the welter of interdependent organizations surrounding the organization in question' (316)----impose some rigidity tending to hold the Forest Service to the status quo (50); and it is impossible to exist in a ''social environment of combative constituencies' without reflecting those constituencies (250).

Finally, the **differences between agency values and employee values can result from the reward system. Perceptions of agency values may simply reflect the reward system rather than the organization's actual values. Many have suggested that achieving timber targets is more strongly rewarded than achieving other targets (66, 104). New employees, forest supervisors, regional foresters, and the Chief's office all "give the agency reward system a low legitimacy rating" (133)--i.e., what the employees believe the agency rewards does not match what they believe it should reward.**

> **Employees gave overwhelming endorsement that the vision statement values** *should* be rewarded by the USFS [U.S. Forest Service] . . . and there was little disagreement between ranks, gender or professional identity. However, most survey respondents believed the agency reward system did not adequately endorse and support these values (133).

PERFORMANCE AND REWARDS

Performance of the appropriate tasks may be the most important aspect of any endeavor. In business, performance (typically measured by profitability) defines success, and achieving long-term success requires that appropriate performance be rewarded (195). Assessing performance is more difficult for a government agency than for a business, because government agencies rarely have simple, financial measures of success. Nonetheless, individuals and organizations respond to incentives (187), and thus a system that rewards ***appropriate*** **performance is necessary.**

As discussed above, Forest Service employees believe that the current system does not consistently reward behaviors that promote the Forest Service motto of Caring for the Land and Serving People. Forest supervisors have written to the Chief that we just can't continue to do more [more targets, more initiatives, more customer service projects, more conflict resolution] with less [money and people]" (91). According to employee opinions, the agency rewards production and team spirit (133). Thus, this section explores the agency's reward system, and assesses the relationship between that system and the planning system.

Production

Production is an important part of any organization's performance. Employees have reported that the agency rewards professional competence and

hard work, and, to an even greater extent target achievement (133). This seems appropriate, since successful efforts (meeting the goals) should be rewarded more highly than unsuccessful efforts. However, observers have suggested that timber targets are more important than other targets to the Forest Service (104); at least timber target achievement is assessed more diligently than other performance (217).

Obviously, employees are likely to expend more effort to achieve objectives that are measured than those that are not. Nonetheless, the lack of appropriate measures of performance is a surprisingly common failing of unsuccessful businesses (195). The entire purpose of the management-by-objectives system widely touted in the 1960s was to identify measurable targets that employees and their supervisors could agree on (220). One problem for the Forest Service is the lack of appropriate performance measures for some of the objectives for national forest management (100).

What Gets Measured, Gets Done

Meeting targets is clearly important to the Forest Service, but what targets get measured? The answer is not as simple as it may seem. The 1990 OTA report on RPA planning (259) assessed the annual ***Report of the Forest Service,*** and found it to be an inadequate report on Forest Service performance. Management activities for the national forests are displayed, but activities are generally not related to targets for national forest outputs or conditions. The only output information contained in the Forest Service's annual report which shows the ***results*** of management efforts is timber sales and harvests.

Several observers have noted the existence of ''hard targets' for national forest management (104, 217).

> The hard targets tend to be the tangible, directly measurable outputs of commodity resource programs: board feet of timber, number of cows or sheep grazed, mineral leasing permits issues (217).

Forest Service managers, not surprisingly, focus their efforts on meeting such ''hard targets."

> Whether or not a forest supervisor has met his or her assigned target for timber sale volume is quickly and unequivocally determined by direct, physical measurement; whether recreation or wildlife targets have been met is a matter of broad professional judgment . . .
>
> Forest Service field officials indicated that the primary focus of performance evaluations continues to be the attainment of the "hard targets" for timber and, to some extent, range and minerals. On most of the national forests, the district rangers in particular indicated that their overwhelming management concern relating to their own performance evaluations was to ''get out the cut, ' that is, meet the annual timber sale volume targets assigned them (217).

The important timber targets are not those established in forest planning, but the targets set in budget process. Congress typically sets targets only for timber in the annual appropriations laws (217). Furthermore, congressional timber targets have consistently exceeded the timber sale levels requested by the Forest Service for the past decade (217) although the timber funding and outputs in the agency's budget request have been below those identified in the forest plans with unconstrained budgets. Thus, meeting the annual timber targets is clearly important to meeting congressional direction for national forest management.

What Isn't Measured, Is Important

In contrast to the hard targets for timber and other commodity outputs, the measures for noncommodity resources are called 'soft targets. ' As noted in chapter 6, consistent and comprehensive measures of nontimber outputs do not exist. Measures of recreation use, for example, have been described as "horseback estimates" (217). Wilderness management is reported in acres managed, which is a function of congressional wilderness designations, not of managerial performance (215). The 'output' of watershed management depends more on the size of the watershed treated than on the efforts or the results (217).

Equally important is the lack of measures of resource and ecosystem conditions. Range, watershed, and wildlife habitat improvements are measured in acres, but results of these efforts are not reported in terms of changes in conditions (100). Even for timber, the Forest Service does not report on changes in resource quality (215).

The Forest Service also does not assess production costs. (See also ch. 8.) Cost data reported nationally are incomplete and inconsistent with appropriations data (259). Unit costs are no longer important to managers in annual budgeting, and inaccuracies result in few sanctions (217). Further-

more, costs are not related to outputs, even for the hard targets, in any meaningful way (217, 254).

It is difficult, if not impossible, to hold Forest Service managers accountable for all the relevant management tasks when appropriate measures for costs, outputs, and conditions are lacking. It is admittedly difficult to develop measures for all the tasks. However, without such measures, Forest Service managers will continue to be evaluated on achieving the hard targets for national forests. In particular, managers cannot be rewarded for achieving and maintaining healthy ecosystems (as employees at all levels believe they should) unless the health of ecosystems is measured, at least indirectly.

Team Spirit

Loyalty, teamwork, and other measures of team spirit are even more difficult to assess. The Forest Service has stressed the importance of teamwork, but has done little to reward or encourage it (131). Little research has been conducted on how to build and maintain esprit de corps, probably because of the difficulties in measuring and assessing it. Clearly, team spirit is important, and has been a traditional strength of the agency. Equally clearly, team spirit, as measured by employee pride in the Forest Service, has declined at all levels of the organization over the past 20 years (133).

Team spirit will be more difficult to build and maintain with the increasing professional, racial, and gender diversity within the agency. Challenging traditional practices is often construed as disloyalty (130), but challenge is likely to be more common in a more diverse agency. Challenge--if done within proper and necessary limits-is an appropriate way of assuring that the agency is responsive to its mission and to the public. An open, strategic planning process, wherein employees and the public agree on management direction for the national forests, can lead to a spirit of cooperation and consistency.

Rewarding Plans and Planning

Forest plans are not just pretty documents to set on a shelf and gather dust. The plans must be implemented—to guide management of the national forests. Forest supervisors must ultimately be responsible for the forest plans and their implementation, and must make the time to ensure the plan is right. "The manager should be willing to devote considerable personal time to the process" (60) to motivate the planning team and assure that the results are feasible.

Plan Feasibility

Clearly, plans must be technically feasible. The chosen alternative must be internally consistent—all the outputs must be achievable and the ecosystems protected. Foresters and other professionals are quite good at examining technical feasibility; as described above, the scientific conservation paradigm common to many physical and biological disciplines emphasizes the technical aspects of management.

The plans must also be politically feasible, at the local and national levels; technical competence is a necessary but not sufficient condition for successful national forest management (316). It has long been recognized that public involvement is needed to understand the social values of the forest (29). The forest supervisors have reiterated the call for effective public involvement, arguing for increasing work with "local, state and national key publics and elected leaders' (90). (See ch. 5.)

A major difficulty for forest planning is the lack of public consensus on how and for what the national forests should be managed (158). Foresters and other professionals are typically not very good at face-to-face, emotional confrontations about management (129). Many of the planning 'failures result because resource professionals are working to change the public's mind about management practices rather than developing alternatives to satisfy public goals' (159). However, foresters have traditionally been committed to serving the public interest (71). This commitment to service must be strengthened and molded to building a public consensus, because consensus is crucial to building politically feasible forest plans (158, 231).

Some have described the goal of the forest planning process to be a "social contract" between the agency and the public (130, 230). This view is useful, but may not recognize the need for plans to be politically feasible at the national level—i.e., consistent with the RPA Program, the annual budget, and other national policy direction from Congress and the administration. (See also ch. 10.) Research indicates that national RPA direction has had relatively little direct effect on the forest plans (213). However, national direction on budgets and on targets can subvert the direction established in the

plans, as described above. Forest plans must be consistent with **likely national decisions about budgets and targets and** other **policy guidance, if they are** to be **implemented. This probably will require modifying the planning and budgeting processes** to impose some **consistency in budget consideration, and to display how budget changes will affect forest plan implementation. (See also ch. 8.)**

Manager Responsibility

Another **requirement for implementing the forest plans** is that the **managers-forest supervisors,** district **rangers,** etc.**—be accountable for performing according** to the **plan. Plans are unlikely** to be **implemented if managers are** not **held responsible in** performance reviews for both the technical and political feasibility of the plans.

Technical feasibility can be assessed annually by comparing actual outputs, changes in conditions, and unit costs with those projected in the forest plan. Some variability is certainly to be expected, and unanticipated events, such as Hurricane Hugo, can devastate a forest. Nonetheless, if the plan was done correctly, it should give a reasonably accurate projection of activities, costs, and results. Managers and their planning teams should be evaluated, in part, on the output condition and cost targets in their plans.

The public also needs to examine the activities, costs, and results of management annually. The annual ***Report of the Forest Service*** **was** intended to provide such information at the national level, although it has not fulfilled this task (259). A comparable annual report on the consequences of implementing the forest plan could provide the public with the relevant information, and many forests are now preparing annual reports (137). However, as discussed above and at greater length under monitoring in chapter 6, the existing measures of outputs and activities are inadequate to assess the results of management activities on total outputs, ecosystem conditions, and unit costs. The lack of complete and relevant measures of national forest production make it difficult to evaluate how managers perform in implementing the forest plan.

Political feasibility, at least at the local level, is also important to implementing forest plans. One simple and obvious measure is the number of administrative appeals and lawsuits filed against a plan. Agency critics have suggested that the apparent increase in litigation, despite increasing public participation efforts, suggests that the agency is not really responding to the public (159). However, one should also recognize that the plans and the subsequent activities cannot be "bomb-proof," because forest plans are not comprehensive, site-specific action plans (13). Forest management is often contentious, and thus some appeals and litigation should be expected. Furthermore, conflict, and even litigation, are not necessarily bad, because they can lead to improved understanding and agreement. Nonetheless, managing conflict and reducing appeals and litigation is a relevant goal for Forest Service managers, and the agency does reward managers who deal with contentious issues at the local level (217).

The number of appeals and lawsuits is one measure of local conflict over management decisions: fewer appeals and lawsuits suggest better conflict management. However, it is possible to reduce appeals and lawsuits without resolving conflicts, by postponing controversial decisions to a later date or to another forum. Managers could, through such techniques, shift the controversies to their successors or to other decisionmaking forums. Thus, the number of appeals and lawsuits is an incomplete measure of the political feasibility of a forest plan. Additional measures of the effectiveness of public involvement and manager responsiveness need to be developed to assure that managers are properly rewarded for preparing politically feasible forest plans.

Difficulties in Accountability

As noted above, the lack of complete and accurate measures to assess the technical and political feasibility of forest plans is a problem. Another, related problem is objectivity-it is difficult for managers and planners to be impartial in monitoring and evaluating the plans they have spent so much time and effort preparing (50). Effective, unbiased assessment of performance requires monitoring by quasi-independent groups within the national forests, such as interdisciplinary teams that include nonemployees (e.g., retirees and experts from various interests). However, purely external monitoring and evaluation can reduce planners' and managers' commitment to developing effective, implementable plans.

A more intractable problem relates to the frequency of transfers for agency employees. Habitual

transfers, including laterals, are important for employees to advance in the organization, but often drain local expertise from a forest (64) and can be a problem for dual-career families (132). Furthermore, frequent transfers and the inability to quickly demonstrate improved resource quality mean that managers face relatively little risk of being held responsible for failures to meet resource quality and ecosystem health targets (215).

In the extreme case, transfers can make one manager and planning team responsible for implementing a plan prepared by another manager and team. Two steps can minimize this potential problem. First, the plan should identify all the relevant information needed for implementation: the participants, their issues and concerns, the current outputs and conditions and their trends, and the goals and direction for managing the forest. Second, improved communication and a sense of shared responsibility is needed between employees and their predecessors. This would include informal talks as well as formal communication, and possibly even joint performance review.

SUMMARY AND CONCLUSIONS

Organizational factors, such as traditions and incentives, affect the ability of an organization to develop and implement strategic plans. Within the Forest Service, the traditional dominance of foresters is changing as the agency's workforce diversifies and as foresters adapt to changes in American society, but Forest Service tradition still exerts a strong influence over national forest management. The reward system for national forest management also determines the effectiveness of strategic forest planning under NFMA.

Forest Service Culture and Diversity

The Forest Service has long been dominated by foresters, and foresters still account for at least half of the agency's professionals and at least three-quarters of its technicians. Foresters, by training and experience, typically emphasize the uses and outputs of forests, and particularly, the management of trees. However, the increasingly urban American society holds a less utilitarian, less anthropocentric, more romantic view of nature. Thus, society increasingly values the nonuse benefits of forests, which are often discounted by foresters.

The Forest Service also employs a variety of other professionals. Traditional engineers and range conservationists hold values relatively similar to foresters, and thus have contributed to the agency's consistent internal philosophy. However, other professionals, such as biologists, landscape architects, and archaeologists, are diversifying the educational background of the agency's workforce, Biologists have become the second largest professional group within the Forest Service (after foresters), and their education typically emphasizes the biological and ecological processes of forests, rather than the utilitarian view of foresters. Thus, as more biologists and other specialists are employed, the values and orientation of the agency is broadened.

As a Federal agency, the Forest Service has long been highly regarded for its professional approach to its mission. The professionalism of Forest Service employees has contributed to the agency's historical success and to the strong esprit de corps within the workforce. However, professionalism also has its costs. The professional training of foresters and biologists emphasizes technical competence. While technical competence is important to, and indeed necessary for, management of the national forests, it inhibits listening to the public. The public is generally perceived as uninformed and overly emotional, while the professionals consider themselves specially qualified to make rational resource management decisions. However, this view often leads professionals to ignore or discount the public's goals for the national forests and public objections to some common management practices.

The Forest Service workforce is becoming more diverse, in racial and gender as well as educational composition. Research suggests that educational diversity is more important than racial or gender diversity in terms of broadening the values and ideas of the workforce. Such diversity is important because it leads to greater creativity and flexibility in management, tends to open more channels of communication to various interests, and broadens the basis for management decisions. However, diversity also creates internal conflict, because new ideas often challenge traditional practices and can seem to be disloyalty to the agency. It takes more time and effort to build teamwork and trust among groups with disparate backgrounds and values than among groups with shared outlooks and experiences. A shared sense of mission can overcome some of the difficulties, but many employees are

concerned that the current motto--"Caring for the Land and Serving People''—is not really being implemented and rewarded.

Diversity is important to developing and using interdisciplinary teams as required by NEPA and NFMA. The Forest Service uses ID teams in forest planning, although in many cases the diversity of specialists is less than that specified in the laws. More importantly, however, the interdisciplinary approach is not used widely other than in forest planning; the Forest Service is still generally organized functionally, by resource specialty. This is particularly a problem in budgeting, as integrated management activities are translated into resource functions; the subsequent appropriations may bear little relationship to integrated management.

Finally, the apparent values of the organization and the employees differ significantly. Regardless of experience, level within the agency, or educational background, employees believe that the agency emphasizes timber above other resources, and primarily rewards outputs and team spirit. However, employees' personal values apparently emphasize recreation, wildlife, and water, and match their perception of the public's values. Employees believe that the agency should also reward healthy ecosystems, long-run concerns, and the welfare of their peers. However, the agency's traditions, normal organizational inertia, pressures from various external groups, and the existing reward system all impede change.

Performance and Rewards

As noted above, employees believe that the Forest Service rewards production and team spirit. Production and productivity are appropriate standards for evaluating employees, but the existing measures are incomplete for assessing performance. ''What gets measured, gets done. Timber and other commodity outputs are more easily and accurately measured, and thus commodity output goals are commonly known as "hard targets." Other national forest goals--noncommodity outputs, nonuse values, and efficiency (unit costs)--are either poorly measured for annual production (i.e., they are "soft targets") or are not measured at all. Thus, employee performance evaluations emphasize achieving the hard targets.

Spirit is far more difficult to measure, and thus to assess, than is production. One problem for establishing and maintaining esprit de corps in a diverse workforce is that challenges to tradition are often perceived as disloyalty to the agency. Strategic forest planning can overcome such perceptions, if the established direction and the subsequent management are widely accepted by the employees (and the public).

Successful implementation of forest plans must also be rewarded. To be implemented, the plans must be technically feasible, something the various professionals employed by the Forest Service are trained to assess. However, the plans must also be politically feasible. This means building a local public consensus on the appropriate management direction and practices for the forest plan, an admittedly difficult but essential task. The resulting "social contract" must also be politically feasible from a national perspective, fitting with the nationwide goals for resource management and for Federal budget priorities and limitations.

Accountability is the key to forest plan implementation. The limited number of performance measures make it difficult to hold managers responsible for achieving all the management goals for their forests, and for the political feasibility of their plans. The number of administrative appeals and lawsuits is one measure of political feasibility, but the number can be reduced by simply postponing controversial decisions to another forum or to a successor. Thus, additional measures of effective public involvement are needed to assess managerial performance in this area. Another difficulty is that managers and their staffs are likely to be predisposed to favorable evaluations of their performance, thus limiting their impartiality in monitoring forest plan implementation. Finally, the habitual transfers of managers can reduce their accountability; one manager and/or planning team may develop a plan which must then be implemented by a successor. These problems can be minimized with distinct monitoring teams and a thorough description of planning participants, issues and concerns, and past and current conditions. The direction and goals in the forest plan also must be clearly specified.

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Chapter 10

Relationship of Forest-Level NFMA Planning to National RPA Planning

INTRODUCTION

The **Forest and Rangeland Renewable Resource Plannning Act of 1974 (RPA) establishes a strategic planning process for an integrated, national examination of renewable resource conditions and opportunities for all forests and rangelands. The strategic planning process envisioned in RPA is structured around the preparation of four documents: the RPA Assessment, the RPA Program, the Presidential Statement of Policy, and the Annual Report. The RPA Assessment is to provide information on renewable resources--conditions and outputs, interrelationships, and present and future supplies and demands. This information serves as the basis for the RPA Program and the development of directions and goals. The Presidential Statement of Policy, transmitted with the Program to Congress, guides formulation of annual budget requests. The Annual Report informs Congress of the Forest Service's progress in implementing the RPA Program. Together, these four documents enable the Forest Service to develop along-term strategic plan to guide present and future management decisions.**

RPA also establishes a strategic planning process, at the local level, that stresses an interdisciplinary approach and public involvement. The National Forest Management Act of 1976 (NFMA) amended the original RPA legislation by providing substantial additional direction in preparing land and resource management plans for the national forests. These forest plans are intended to set long-term direction for on-the-ground management activities, including desired future resource conditions and subsequent management actions to achieve those conditions. In contrast to the national scope of the four RPA documents, the forest plans guide management activities at the local level. The plans take into account local situations, capabilities, and opportunities, and attempt to balance local resource uses and values to accommodate the public's interests.

If the strategic planning process envisioned in both RPA and NFMA is to be effective, national direction and goals must mesh with local capabilities. The RPA documents must incorporate information from the local level on resource availability and conditions as well as on public opinion, desires, and concerns. The information on local interests and capabilities must be available for use in the national analysis. Only with this meshing of national and local planning can the forest resources be managed sustainably for the future.

THE CURRENT RPA-NFMA LINKAGE

Congress did not envision a clear, direct system for meshing national and local planning efforts (329). The RPA and NFMA planning processes have been evolving slowly, however, to become more intertwined. Historically, the Forest Service has approached planning as a hierarchical process that allocates resource output targets from the RPA Program to the regions, and from the regions to the forests (206). This approach contrasts with the description of the linkage between RPA and NFMA in the Forest Service regulations as:

> **. . . essentially iterative in that the information from the forest level flows up to the national level where in turn information in the RPA Program flows back to the forest level (36 CFR 219.4(a)).**

In 1989, Forest Service Chief Dale Robertson (206) testified that the 1990 RPA process was influenced by an integrated approach, with "more careful consideration of the resource opportunities as developed in the forest plans. " This integration was accomplished by using data from the plans in the RPA Assessment and by building RPA Program strategies using forest plan standards and guidelines. Robertson stated that, because most of the forest plans are now complete and more comprehensive than earlier plans, data from the forest plans were used extensively in the 1990 Program. Thus, the 1990 program may mark the beginning of an iterative exchange of information, from the forests to the national level and the national level to the forests, contemplated in the regulations.

The historic pattern of top-down targets from the RPA Program to the national forests was possible before the completion of the national forest plans

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only because of lack of information. Many forests took 10 to 15 years to complete their frost plans under NFMA, providing little information from the local level to feed into the national process. The lack of final forest plans permitted the top-down flow of information to dominate, and led to allocation of resource output targets from the national level to the regions and forests.

RPA target allocations are difficult to mesh with NFMA planning because: 1) targets are set only for outputs and 2) allocated targets may be infeasible. Output targets are not necessarily incompatible with local level strategic planning, but forest managers do not have the measures to determine annual outputs for all resources. (See ch. 6.) Annual timber production can easily be measured, and is directly under the control of the managers, but recreation use, water flows, wildlife populations, and other uses and outputs are less easily measured, and less readily governed by managers. Furthermore, the RPA Program has not established effective targets-those for which managers can be held accountable-for resource conditions of forests and rangelands. Thus, RPA targets have become synonymous with national timber sale targets.

Equal treatment of all resources could be accomplished by setting national targets for all important outputs and conditions. This approach would require developing measures for nontimber values-an admittedly difficult task. Meaningful production and condition goals for recreation, range forage, water, wildlife, and fisheries have not been established, and reported accomplishments might be impossible to verify or to evaluate objectively (277). Nonetheless, accountability standards for all important forest and rangeland outputs and conditions are a prerequisite if the RPA process is to establish broad and balanced direction for the Nation's renewable resources.

Even if acceptable national targets are established for all significant outputs and conditions, the allocated RPA targets probably would not match the targets set in forest plans. NFMA plan targets are developed locally, with information on resource conditions and interactions and with substantial public input. The dilemma arises as to how to decide between allocated RPA targets and NFMA plan targets. Should national targets override the NFMA planning process when so much time and effort goes into local planning? Allocated RPA targets could make local analysis and public involvement in NFMA planning useless and ineffective, because targets are set by people removed from the local resource conditions and public desires. Alternatively, should the local planning process ignore the regional, national, and global concerns reflected in the RPA targets? NFMA planning targets could result in missed opportunities or regional dislocations not considered locally.

A second, and more serious problem in trying to mesh RPA targets with NFMA planning, is that allocated RPA targets maybe infeasible, despite the resource capability information in the NFMA plans. In past RPA Programs, resource production goals, especially for timber, have been a reflection of projected national demand more than a reflection of the resource capabilities to actually meet that demand (277). Even before NFMA was enacted, participants of a national symposium organized by the Forest Service at Pajaro Dunes, CA, discussed the need for data aggregation to proceed in a local ''bottom-up' approach (192). In addition, even with aggregated local data from the forest plans, national analyses of capabilities and opportunities necessarily lack information on site-specific resource interactions and conflicts. RPA analyses, therefore, will typically overestimate the productive potential of the lands being analyzed (72). (See ch. 7.) Thus, the national planning process under RPA is likely to overstate the opportunities for producing outputs from the national forests.

DIRECTION AND FLOW OF INFORMATION

The conflict between allocated RPA targets and directions established in NFMA planning might be alleviated if the flow of information between the forest plans and the RPA documents is continuous and two-directional. Precedent has been set for a process that is based on capabilities set locally, with general guidance from the top. In a 1988 court case, a Federal district court ruled that while production targets under a timber management plan are important goals, they are not legally enforceable decisions (277). The Chief of the Forest Service expressed agreement with this decision in an internal memo to the regional foresters (207).

The compatibility of output potential determined at the local level, and output goals determined at the national level, must be discussed and planning adjusted depending on national and local interests,

resource sustainability, and budget allocations. This approach would shift the RPA Program's emphasis from setting hard targets for the national forests to setting an overall direction for the Forest Service--for Research, State and Private Forestry, and International Forestry as well as for the National Forest System. The Program would guide national policies and identify considerations and approaches for NFMA planning. The NFMA plans would determine capabilities based on resource inventory and monitoring, public input, and local managerial expertise.

To summarize, the Forest Service regulations describe the information flow among the RPA documents and the forest plans as iterative. Information from the plans is used in compiling the RPA Assessment, and the plans and the Assessment contribute to the RPA Program, which then provides guidance for the forest plans. The problems created by this process could be alleviated with a continuous and interactive information flow among the four RPA documents and the forest plans.

NFMA Planning and the RPA Assessment

Data gathered to prepare the national forest plans and to monitor plan implementation provide basic information on resource conditions and predicted outcomes of proposed management actions, and on opportunities and limitations for expanding the uses and outputs of the national forests. Forest planners should be aware of resource demands outlined in previous Assessments and compare local assessments of physical, biological, and economic capabilities of the land with the national assessment, to assure that the conditions and possibilities considered in planning address national concerns (277). Standardized procedures and measures for inventories and monitoring can improve communication and minimize the costs of developing analytical models-each forest can take advantage of computer capabilities and models developed for the entire agency (51). (See also ch. 6.)

The RPA Assessment can assist forest-level planning by serving as a source book for planners. First, the Assessment provides information on methods used on national forests, private, and other public lands to collect data on resource outputs, conditions, and trends. This information can help planners design inventories and monitoring activities on their forests so that data will be compatible with previous inventories and with studies in progress. Measures used on the national forests must also be comparable to measures used on private and other public lands so that data can be aggregated and compared. Coordination of data measures allows information from the national forests and from private and other public lands to be used in a comprehensive analysis. These data are then available for national use in the RPA Assessment, Program, and Annual Report.

In addition, the RPA Assessment (and the supporting data) is a source of information for forest planners to consider in examining alternatives for their national forests. The Assessment is to describe the existing resource conditions and outputs from private and other public lands, as well as from the national forests. Forest planners can use the Assessment database to assess the extent to which various regional, national, and global concerns are being addressed on the lands surrounding their forest, and thus can assess the need for addressing such concerns in their forest plans. The RPA Assessment, therefore, is a source of information on inventory and monitoring measures and methods and on the conditions and outputs from lands surrounding the national forests.

NFMA Planning and the RPA Program

The forest plans can contribute to the RPA Program by providing information and guidance on the public's preferred management alternatives for the National Forest System. The forest plans are developed with substantial public input, and thus should describe locally acceptable management direction. Furthermore, the NFMA planning process identifies public issues and concerns relevant to the management of the national forests. Issues and concerns that are widespread at the local level should receive special attention in the Program. For example, a national policy on below-cost timber sales might demonstrate agency responsiveness to public concerns. In essence, NFMA plans are part of the public's participation in the RPA process.

As a strategic plan, the Program needs to set direction for all planning on the national forests as well as for research, cooperative assistance, and international programs. The Program, however, should not override local decisionmaking. Instead, it can augment NFMA planning by addressing regional, national, and global problems not identified

or considered locally. The Program can then include issues and concerns to be considered in amending and revising the forest plans, with a clear explanation of why such issues are of regional, national, or global concern and should be addressed in national forest management. This interpretation of the influence of the RPA Program on local planning is patterned after a theme of "firm central direction and maximurn individual autonomy' '—a theme common to effective organization in the private sector (195). This view was expressed by Chief Robertson in his 1990 testimony, stating that resource output targets will be replaced by more flexible, general guidance from the RPA Program (206).

Strategic planning does not require the elimination of national targets. In fact, targets may be critical to reaching stated goals for the various resources. Hard national targets, however, can effectively negate local decisionmaking, if targets are set only for certain outputs and only for the national forests. Such targets also tend to discourage an interactive flow of information from the local level to the national level and thus run counter to functional strategic planning and the iterative process. Alternatively, national output and condition targets can be used to identify impending or potential problems that are to be considered in national forest planning, in setting research priorities and in determining the financial and technical assistance needed by States and private landowners.

NFMA Planning and the Budget Process

The forest plans are intended to serve as the basis for developing the agency's annual budget proposal (217). However, the budget requests from the forests cannot simply be added together to arrive at a grand total for the National Forest System, because the forests have used different assumptions about possible budget levels in their NFMA plans. (See ch. 8.) Currently, the forests identify the appropriate projects for implementing the forest plan. These multiple-use projects must then be converted into budget requests by resource activity, and the budgets for each resource activity are subject to modification by the administration and Congress.

The Forest Service budget request for the National Forest System must be balanced against overall spending constraints and management priorities. According to Chief Robertson (206), the rate of forest plan implementation-and the mix of projects carried out under the plans-depends on the annual Federal budget process:

> [The] forest plans are strongly linked to and dependent on the national budget process. As we develop our annual agency budget request, we carefully consider the needs documented in the forest plans in light of competing agency priorities and constraints. Ultimately, the rate at which we are able to implement each plan-and the relative emphasis given to each component of the plan--reflects national priorities and constraints that are resolved as the President proposes a budget and the Congress appropriates funds.

Congress appropriates funds by resource activity. The appropriations are then allocated to the regions, and subsequently to the forests. The appropriations by resource must be converted back into multiple-use projects, not an easy task because it is unlikely that the appropriations will match the balanced mix of resource activities needed to implement the forest plans.

A better flow of information between the forest planning and the budget and appropriations process is needed for implementing the forest plans. Congress needs accurate information on the likely outputs and conditions that will result from implementing the plans with a given level of appropriations. Congress also needs information on the improvements possible with increased tiding, and on the consequences of reduced funding. Furthermore, the local publics need to know how the forest plan will be implemented, if the full funding called for in the plan is not appropriated. Thus, to be integrated with the budget and appropriations process, the forest plans must contain information on the likely outputs and conditions under a range of budgets, including both the most likely and the most desirable budget levels.

The budget and appropriations process also must be better integrated with forest planning. The current structure of appropriations by resource activity is inconsistent with the integrated, multiple-use management direction established in the plans. Congress may object to reducing the current budget details, fearing a loss of control over the Forest Service budget. However, actual expenditures and accomplishments often differ, sometimes substantially, from the appropriations and from the reported expenditures and accomplishments. Furthermore,

special accounts and trust funds account for more than a third of the Forest Service budget, but the substantial agency discretion over the size and use of these funds occurs with little congressional control or oversight. Thus, Congress has, in fact, already lost some of its apparent control in the appropriations process. Congress could reestablish control over the Forest Service budget while allowing the implementation of national forest plans by:

1. **appropriating funds by activity (e.g., planning, producing, maintaining, investing, monitoring) rather than by resource;**
2. **examining the use and discretion over permanent appropriations; and**
3. **requiring full disclosure of expenditures and unit costs for significant activities-regionally and fictionally.**

NFMA Planning and the Annual Report

Monitoring of the forest plans can provide information to be presented in the Annual Report on the expenditures and results of management activities on each national forest. This information can be used to compare the performance of forest supervisors and regional foresters, and thus can serve as an incentive for the Forest Service to make sure its efforts are balanced and efficient.

Peer pressure is an important component of quality performance. Thus, monitoring of forest plan implementation should provide information for the Annual Report on what each forest is doing and how well management activities have been implemented. Consistent reporting is necessary so that data can be aggregated and compared. Unit cost information is important, especially for certain critical activities and results, such as reforestation success, timber sale preparation and harvest administration, and wilderness quality improvements. Furthermore, as discussed earlier, measures are needed for all the important outputs and conditions, to assure that all goals are being achieved; finally, management activities, such as range improvements and watershed rehabilitation, must be related to the outputs and conditions of interest to Congress and the public.

A third connection between forest planning and the Annual Report may be the identification of important issues that arise quickly, in the time between RPA Programs. To address rapidly emerging issues in a timely fashion, the issues can be discussed in the local context and included in Annual Reports. In this way, forest planning and the Annual Reports can serve as issue scoping for each RPA program, and as a basis for considering new or revised policy direction for national forest management.

NFMA Planning, RPA, and the Role of the Regions

In the RPA and NFMA planning processes described in this OTA assessment, the regional offices serve three main purposes: to aggregate data, to allocate budgets, and to coordinate and facilitate problemsolving of regional scope.[1] Budget and resource data from all of the national forests are too unwieldy to accommodate directly at the national office. The regional offices can aggregate these data and present them to the national office in a manageable form. The regional offices also work with budget decisions from the national level, allocating budgets to the forests.

The regional offices' third role, to coordinate and facilitate problemsolving of regional scope, maybe especially important when problems involve several forests as well as State, private, and other public lands. The regions can identify issues common to several national forests, and can assist in coordinating responses and identifying issues that need to be addressed nationally, in the RPA planning process. The regional offices can also serve as a focal point for coordination with State agencies that have a stake in national forest management, including agencies that regulate forest practices, that manage wildlife populations, and that enforce water rights and water quality standards.

If the RPA Program is not seen as a document providing hard output targets and budgets to the forests, the regions would not be required to serve as a liaison in these areas. Rather, they could provide coordination between local decisionmaking (as the major impetus behind planning) and national policy guidance. The regions could assist in finding ways to deal with regional disputes and conflicting interests before they are brought to national attention.

[1]Regional offices undoubtedly serve other functions, as well, but this section focuses solely on their role in RPA and NFMA planning.

CONCLUSION

Concern over land and resource capability and sustainability has contributed to the debate over centralized, top-down planning versus decentralized, forest-based, bottom-up planning (277). Resource capability information developed at the local level was intended to provide the foundation for RPA planning; at the same time, national objectives are essential to strategic planning and setting long-term goals. National and forest level information ''address the nations's resources demands and recognize natural and practical limitations of the land and forests to meet those demands' (277).

Binding targets set at the national level in past RPA Programs have resulted in a concentration on timber outputs, at the expense of considering other outputs and conditions. Furthermore, national analyses are likely to overestimate productive potential, because site-specific resource interactions are necessarily lost in aggregating data on local capabilities. Replacing hard targets with general guidance and flexible goals would lessen the emphasis on top-down planning and allow for a more iterative process, as prescribed in the regulations.

A two-directional, interactive exchange of information between local forest planning and national RPA planning would encourage resources to be managed for realistic and desired goals and long-term sustainability. The forest plans can provide information: on resource capabilities for the RPA Assessment, on public desires for national forest management for the RPA Program, on opportunities and likely results for the annual budget, and on the results and costs of management for the Annual Report. The Assessment database can inform planners about conditions and outputs from neighboring lands, and about measurements and methods for inventorying and monitoring. The Program can provide policy direction for considering regional, national, and global issues and concerns. The annual appropriations determine the extent of implementation of the forest plans. And the Annual Report allows managers to compare their performance in implementing the forest plans with the performance of their peers. Thus, by improving the flow of information between local NFMA planning and national RPA planning, the national forests can be managed to achieve local desires, address national needs, and assure the long-term sustainability of the forest ecosystems.

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